The Builder.

VOL. LVII. No. 2443. SATURDAY, NOVEMBER 30, 1889.

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Byzantine Architecture in Greece: The Athenian Churches.

TO architects the name of Greece is generally associated with the great monuments of Classic antiquity which the volumes of Stuart and his successors have made familiar to us, and Athens is synonymous with the Parthenon and Penrose's great work on its geometric proportions and subtleties; still there exist, for those who care to look for them, specimens of the more homely and less pretentious architecture of the Byzantine and Mediæval period, in the shape mostly of quaint and curious little churches of striking individuality which the visitor cannot help coming across in the streets of Athens, on the slopes of its Acropolis, and scattered about in various parts of the country, and where the churches themselves have disappeared he is often surprised to find against the walls of pagan structures remains of Byzantine paintings, sometimes hardly distinguishable, showing that a Christian shrine once stood there. In the great temple of the Athenian Acropolis itself he sees traced on the walls of the interior the faint outlines of Christian saints and martyrs; on the pillars of the exterior the records of the Christian bishops of the city; and in the floor he may observe the vaults where they were laid to rest. As we get familiar with these things we wish to know more about them, and we feel that history did not stop in Greece with the coming of the Romans and begin again only with the War of Independence, as the Greek of to-day would have us believe, but that this little country played a not unimportant part in the troubles and changes of Mediæval times.

Couchaud, a French architect, published, over forty-five years ago, a book on the Byzantine churches of Greece, and illustrated it with drawings of several of the most important ones; these studies, however, are very slight, and in many cases not to be trusted; but his work is, nevertheless, interesting, as giving us valuable data regarding churches which have since entirely disappeared, or have been altered beyond recognition.

After the Greek revolution, when Athens was quite a small village, it contained a large number of interesting churches; and although a great many of these were in ruins, having suffered severely during the struggle, they still retained valuable records of Christian history in their sculptured slabs and frescoed walls. The greater part of them have since been pulled down, and in most of those that remain the old paintings have disappeared under a coat of whitewash, or have given place to modern decoration.

Mommsen tells us that in Athens alone over seventy churches were destroyed by order of the Greek Government about the year 1840, and the money realised by the sale of the materials was used to help the building of the new Cathedral, the new University, &c. Finlay, in his History of Greece (1855), says:—

"The Acropolis and city of Athens, even to the present day, contain some rude but laborious sculptures executed during the period of Frank domination; and their number was much greater before the recent reconstruction of the town and the destruction of numerous Mediæval churches, which formed a valuable link in the records of Athens, and an interesting feature in Athenian topography, while they illustrated the history of art by their curious and sometimes precious paintings. But in the space of a few years the greater and most valuable part of the paintings have disappeared, and hundreds of sculptured monuments of Byzantine and Frank pride and piety have been broken in pieces, and converted into building materials and paving-stones."

This process of destruction has been going on continuously since then. On the Acropolis of Athens, in the great desire to retain only remains of classic times, most valuable evidences of Mediæval and Turkish occupation have been completely swept away. To show further the absolute indifference with which the Greek archæologists regarded things Mediæval only a few years ago, another case may be cited which speaks for itself. During the digging round the Erectheum, about three years ago, where the Archaic statues, now in the Museum, were found, all the surplus soil was thrown over the north wall of the Acropolis, close at hand. Immediately under lay a small Byzantine church; no means were taken to protect it, and the accumulating pressure of earth from above soon turned it into a ruin and almost entirely buried it, and to-day part of a wall and a carved door-lintel can still be seen showing through the mass of *débris* which disfigures this side of the Acropolis rock.

It is only within the last two years that the Greek authorities, principally through representations from foreign travellers and archæologists, have become alive to the importance of looking after and preserving these relics of Mediæval times which have not been cleared away in this stream of devastation, and now steps are being taken to have the buildings cared for and assured from further neglect.

Naturally paganism died hard in Greece. The old religion and the new went on side by side, and Athena continued to be worshipped in the Parthenon 200 years after the founding of Constantinople, although, according to contemporary historians, the greater part of the revenues of the temples had already been converted to other purposes, and part of them had been handed over to the Christian bishops. At length Justinian, about the year 529, published an edict ordering the closing of the Parthenon. The philosophical schools were also suppressed by this Emperor, and the worship of the old gods of Olympus thus received its death-blow at Athens.

The Parthenon was afterwards converted into a Christian church, and dedicated to the Holy Wisdom. The Erectheum also was turned into a church. Generally, we find that the temples of the old heathen deities became the shrines of the new faith, and in the same way the gods of the old religion gave place to the saints of the new; thus the temple of Poseidon, the god of the sea, became the Church of St. Nicholas, patron saint of sailors; Theseus was changed to St. George; Zeus to St. Elias; Aphrodite to the Virgin; and the twelve gods to the twelve Apostles.

Although the old gods and goddesses had continued to be worshipped up till this time, Christianity had made great progress. Tradition says that in Justinian's reign there were more than 300 churches and chapels in Athens alone, but this number does not appear so great when we consider that every little cave where burned a light before a sacred picture was deemed a chapel, and that each church had only one altar, on which only one mass could be celebrated daily.

Justinian himself is supposed to have built twenty-four new churches in the city, but we cannot identify any of those now standing as of his time.

Although we have hardly any record of the dates of the Athenian churches which now exist, it is possible to roughly classify them according to their architectural characteristics, and principally by the different types of plan. Of these, broadly speaking, there are three

which we may distinguish as, first, the plan with the large central dome, this we may call the St. Sophia type; second, the Greek cross plan, with a small dome at the crossing; third, the western or basilica form. In addition to these are the small grottos or cells in the caves of the Acropolis, which we need hardly touch on here, and the Heathen temples which were converted into Christian churches. The former are generally covered with remains of interesting paintings, of the latter none are in actual use at the present day.

The Parthenon probably became a place of Christian worship early in the seventh century, and the changes made in adapting it to its new use were apparently very slight. The western door, that into the opisthodomos, became the entrance. The opisthodomos itself became the narthex, and the naos of the temple became the naos of the church. The internal pillars were removed, whether at this time or later we cannot determine, and smaller pillars substituted with undoubtedly a gynæconitis or gallery for the women over on each side. The original entrance from the east was widened, and an apse projected into the pronaos of the temple. This apse had a mosaic on a gold ground, containing a representation of the Virgin.

Whether the roof was a simple vault it is impossible to say, and how the lighting of the interior was managed must remain entirely conjectural. In the opisthodomos or narthex are still to be traced remains of paintings, some of an early period, probably contemporary with the time of its conversion into a church, and some much later. These paintings are in a lamentable state of decay, and bear traces of having been restored at various times. They have been painted directly on the walls, the polished surface and mellow tone of the marble forming a delightful background.

To return to the churches in the town: the first, or St. Sophia type, is represented by one church, that of St. Nicodemus, the largest and probably the oldest of all. Fifty years ago it was falling to pieces through decay and neglect, but since then it has been handed over to the Russian Legation, who have restored and redecorated it, and it is now used as their chapel. From the accompanying plan (fig. 1) it will be

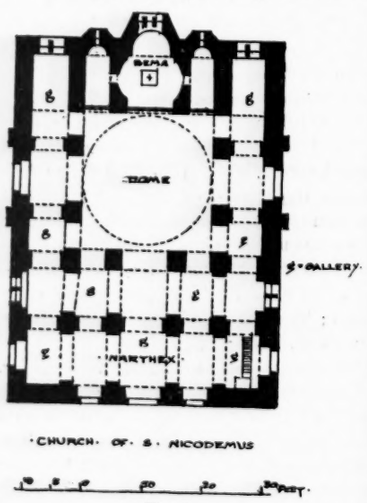


Fig. 1.

seen that externally it is oblong in shape with three apses projecting from the east end. Internally the central square, over which rises the dome, is the most prominent feature; this dome is of the earlier variety, the hemisphere springing direct from the pendentives and the windows impinging into it all round. There is a gallery for the women, the only one remaining in Athens, round three sides of the church.

It is vaulted throughout and externally has a terraced roof, where it again differs from the other churches in the town. In Couchaud's time there were considerable remains of frescoes in the interior. In none of the Athenian churches have been found traces of marble linings to the walls or mosaics to the vaults and domes; if these ever existed they must have long ago perished and given place to fresco painting.

Tradition assigns the building of this church to the Empress Irene (died 803), who was a native of Athens, and who was said to have founded twelve churches in her native place. There is no authority for this tradition, but judging the church architecturally, it might well have been erected early in the ninth century either in the time of Irene or shortly after under the Emperor Theophilus (829), who was a lover of the arts and a great builder.

We now come to the churches with what we have called the Greek cross type of plan. In Athens the principal illustrations of this variety are the old Cathedral or Metropolis, the church of St. Theodore and the Kapnikarea church. Of the former we shall speak in detail further on. The dates of the two latter are very uncertain. In 1019 the Emperor Basil II., after having defeated the Bulgarian invaders of Greece, visited Athens amidst general rejoicing, and presented rich gifts to the city and rich dedications at the shrine of the Virgin in the Parthenon. These churches are not earlier than this time, and may probably have been built during the period of prosperity which followed. The name "Kapnikarea" is curious, and Christian archæologists are divided as to the nature of its origin. There is a legend that the interior of this church was set on fire during the disturbances which followed the Venetian occupation of Athens towards the end of the seventeenth century, and that a sacred picture of the Virgin, a precious relic, kept in this church, which was dedicated to her, was found afterwards miraculously preserved, having only been blackened by the smoke—kapnos. Others trace its derivation from a Turkish word signifying a handkerchief or veil, the picture having been protected by a covering of this nature.

We may here take a plan of this second or Greek cross form (fig. 2) as a general type of a Byzantine church, and proceed to examine it in detail. The plan is of oblong form externally, with one or three apsidal projections at the east end. Inside is inscribed centrally a Greek cross, with short arms, and having a dome over the joining. The internal arrangement of the church may be broadly divided into three parts:—1st. The bema, or sanctuary, with its parabemata or side-chapels, occupying the eastern part. 2nd. The naos, or body of the church, comprising the cross and the small squares filling in its four angles. 3rd. the narthex, or pronaos, at the west end. These three divisions serve three distinct purposes,—the sanctuary for the Holy Mysteries, the naos for the faithful (clerks and laymen), and the narthex for the penitents and catechumens. The bema or sanctuary, which is raised one step above the rest of the church, is strongly marked off by the ikonostasis, or picture-stand. It does not take the place of the rood-screen in a western church, but rather that of the altar-rail. In the earlier churches this screen was generally of an open character; two marble columns divided it into three parts, and on the top of these was a lintel or cornice of marble richly carved. Between the columns, at the sides, were often placed carved slabs breast high, and over these the altar was screened off from the vulgar gaze by embroidered curtains attached to the lintel. The central opening had a low door, and over that a curtain also.

The cornice being kept moderately low, worshippers were able to see the painting and decorations which covered the upper part of the walls of the bema. Remains of these screens are still to be found, but the form more generally met with is made of wood, and of a light construction. It has one or three doors, and is divided into compartments by pilasters, and in these compartments the sacred pictures are arranged according to fixed rule. The upper part has a continuous series of small pictures representing the twelve apostles and the principal scenes in the life of Christ. The cornice over this is ornamented with palms or vines, and over the centre is a cross. Lamps are suspended before and near the pictures, and in front of the screen stand large candelabra.

Inside the bema is the altar, or sacred table, its proper position being the centre of the chord which bounds the apse. The Greek churches have each but one altar, and only one mass is allowed to be celebrated on this altar every day. However, in abbey churches, where there are several priests, we may find several altars, but this is an exception to the general rule. The altar-table is usually of stone. It represents Christ as the Rock and Head Corner-stone of the Church.

These stones are often fragments of antique columns. The altar of the Eastern church is essentially a table, recalling that of the Supper at Cana, and it was never a martyrium or tomb, as in Western churches. It sometimes had over it a ciborium, supported on four columns and covered by a dome.

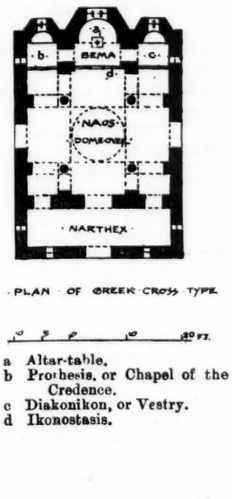
The apses of the earlier churches were similar to those of the Western basilicas. They were semi-circular, and that shape is still retained internally. It is related of Justinian that he intended to construct the apse of S. Sophia without windows, but an angel, clothed in the imperial purple, appeared to the architects when they were going to carry out his instructions and ordered them to light the altar by three windows, in honour of the Father, of the Son, and of the Holy Spirit. Most of the later apses have either three distinct windows or one window with three lights. The throne of the bishop usually occupied the end, and on either side were seats for his subordinates. In the semi-dome of the bema is generally a representation of the Panagia, the All Holy, the Mother of God, seated on a throne, and in her arms the infant Christ. Under this is often depicted Christ, as the Great High Priest, dispensing the Holy Communion to his disciples.

The chapels on either side of the bema are occupied, that on the north as the Prothesis, or Chapel of the Credence, the other as the Diakonikon, or Vestry. These have usually smaller apses projecting externally.

There is no chancel, properly so called, the singers grouping themselves in front of the screen in one or more bodies.

As we have already mentioned, the naos or body of the church occupies the space taken up by the cross and its complements; over the central part is the dome; the top limb of the cross next the bema may be called the choir, it being the place where the singers take their stand, and the other end is the nave. The side arms of the cross form short transepts, and they generally have doors communicating with the outside. The dome is supported on four square pillars or circular columns joined by arches, and also connected by arches and vaults with the main walls of the church. In the angles over these piers are pendentives supporting, in these later churches, a vertical drum in which are the windows, and from which springs the dome itself. Thus the dome is considerably heightened, but while this may, perhaps, improve its external appearance, it takes away from its effect internally, and prevents the faithful on entering the church from seeing the figure of Christ the Pantokrator, the All-powerful, which always occupies the centre of the hemisphere, symbolising His triumph over death and His ascension into heaven, from the celestial vault of which He watches over and protects His church on earth.

Between the naos and the narthex or pronaos is a wall pierced by three doors, the central one being larger and more ornamental than those at the sides; it extends across the whole end of the church, and is entered from without by a single door. In front of this again we occasionally find an exonarthex or porch, which sometimes has an open colonnade in front, like those of the Western basilicas. A distinction is often drawn between the paving of the body of the church and that of the narthex; this difference has existed from early times, and marks the narthex as being outside of and subordinate to the church proper. At Kaisariane, a monas-



a Altar-table.
b Prothesis, or Chapel of the Credence.
c Diakonikon, or Vestry.
d Ikonostasis.

Fig. 2.

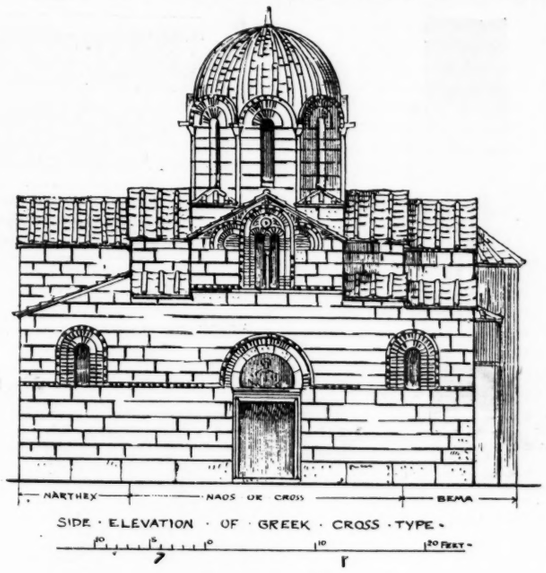


Fig. 3.

tery at the foot of the Mount Hymettus, the floor of the church is of marble slabs, and that of the narthex of terra-cotta tiles.

Instead of the square façades and terraced roofs of the earlier buildings, the exteriors of these churches (fig. 3) are more broken up, and show plainly the general lines of the internal subdivisions.

Thus we see the form of the cross clearly defined, the small angle squares being roofed over at a lower level. At the end of each limb of the cross is a gable, and over the centre rises the dome, the most prominent feature of the grouping. Each gable is separate and distinct; where we find a multiplication of gables on the same face, we know that they are of later time and show Western influence. To the east is the bema, its roof slightly lower, and beyond it again are the apses abutting on the end walls. At the west end is the narthex, the lines of its roof clearly marked. This emphasis of bema and narthex is more developed externally on some churches than on others. The walls are generally built of squared blocks of Poros stone, a species of lime-stone which has been largely used since early times; alternating with each course of stone is a course of flat tiles about $1\frac{1}{4}$ in. thick, the mortar joints between being of an equal thickness (fig. 4). These tiles are

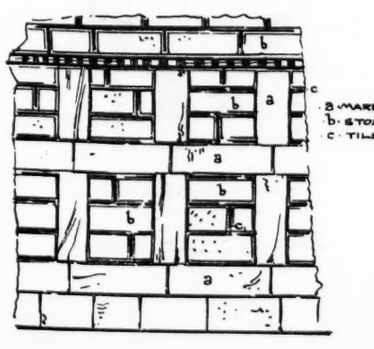


Fig. 4.

placed between the stones vertically as well as horizontally, and they form a pleasing combination, the red of the tile with the yellow colour of the stone. Where old marble blocks of larger size have been worked in, as in the lower part of the Kapnikarea church, they are often used in combination with the smaller blocks of stone and tiles, and the result is an effective and rational method of wall treatment.

String-courses, where they are not a simple marble hollow or splay, are composed of a course of tiles laid diagonally between two straight rows, this forms a kind of zigzag ornament. This same zig-zag is to be seen in colour, copied undoubtedly from a practical example, dividing the rows of figures in the early frescoes on the walls of the Parthenon. The eaves courses are formed somewhat similarly to these strings, but with this difference, that while in the strings the angle tiles are set in flush with the face of the wall, at the eaves they project forward.

The Church of S. Nicodemus, which is built with alternate courses of stone and tiles as described above, has a more elaborate string-course going round the building at the level of the springing of the door arches (fig. 5).

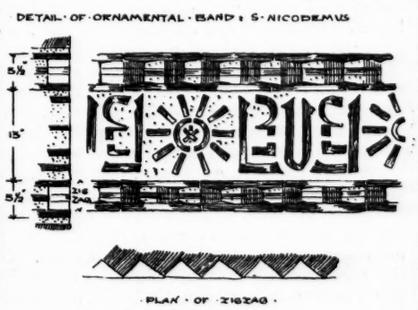


Fig. 5.

It is 2 ft. deep over all, a long top and bottom are zig-zag, and, between these, curiously-shaped tiles are set endwise into the mortar, and arranged to form a repeating pattern. These curious tiles are also used for filling in over the two and three light windows between the outer and inner arches.

The windows are of three kinds, one, two, and three lights. The single windows (fig. 6) are

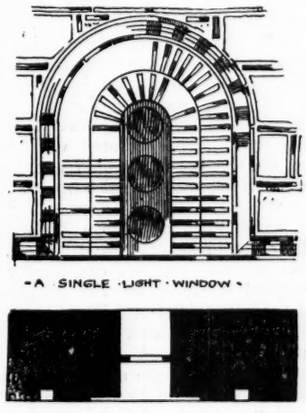


Fig. 6.

generally found on the side elevations lighting the narthex, and the small squares of the naos. They have simple tile jambs and arches, usually a double row of tiles, the inner one being set about an inch back, and on the outside of these the zig-zag course runs round.

The two-light windows (fig. 7) are used in

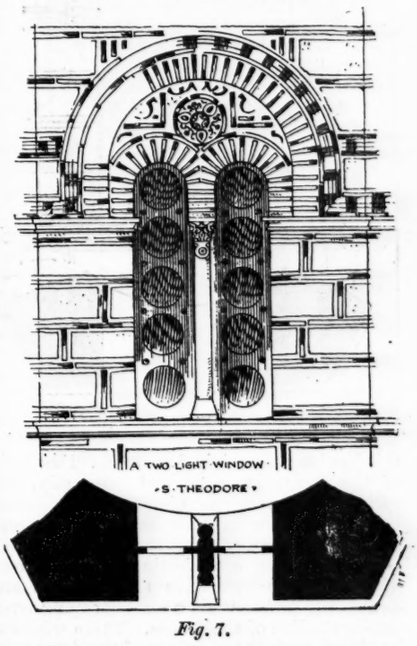


Fig. 7.

the side gables and in the smaller apses, and sometimes the large apse has three two-light windows, one on each of its three sides. Those in the gables have tile-jambs and arches, the inner row of tiles forming an arch over each light, the outer enclosing both. The mullions are thin, flat marble slabs, rounded or splayed into an octagon form on edges, and finishing on the top with carved pateræ or leaves. The cap is of a splayed form, and projects much more in front than at sides; on the face a foliated cross is usually cut. Occasionally we find a splayed base, but often there is none at all. In the apse windows the jambs are formed of the stone and tile courses of the walls, the arches of tiles only. Some of the windows in the church of St. Theodore have had ornamental glazed lustre plates fitted in the spaces between the inner arches and the outer enclosing ones. We find plates used decoratively in this way on the exteriors of some of the Early Italian churches. The church of St. Theodore also possesses a very fine string-course band of reddish terra-cotta slabs, which runs along under the windows of the gables. These slabs are about 15 in. long by 7 in. deep, and about an inch thick, and the forms of the flat ornament vary on each.

The three-light windows (fig. 8) are generally situated at the end of the main apse. The lights are sometimes of equal height and width, but occasionally the central one is both higher and wider. They are arched as the others, but frequently with only a single row of tiles, and no outer enclosing arch.

The window openings were filled in in various ways. A wood trellis of a delicate and ornamental character was used in early times. This gave place to thin marble slabs, pierced with openings of various shapes, such as circles, stars, or polygons. Few of these now remain.

The doors are also arched, and sometimes the arch takes a horseshoe form, as in the side doorway of the Kapnikarea church. This kind of arch was used by Byzantine architects as early as the fourth century, and was undoubtedly borrowed by them from the further East. In the opening under the arched head we find inserted a set of marble jambs and a square lintel and cornice. These are moulded and often carved. In the tympanum, which is usually recessed, are seen traces of painting over the west door, generally a figure of the saint to whom the church is dedicated. The gables of the cross are of a flat pitch, the roofs being almost universally tiled. Probably

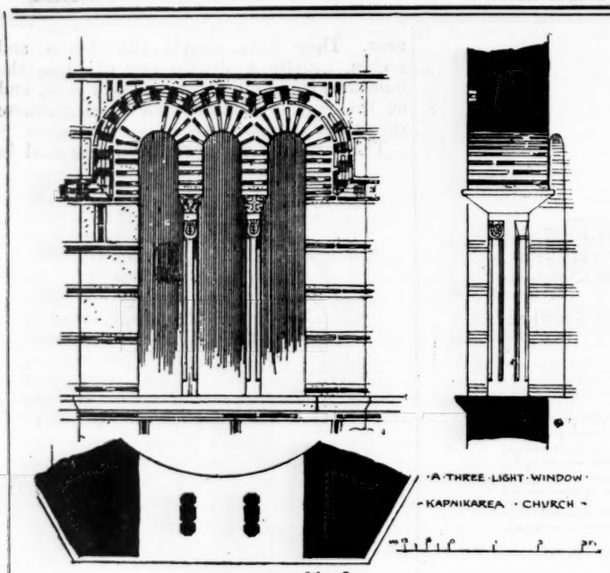


Fig. 8.

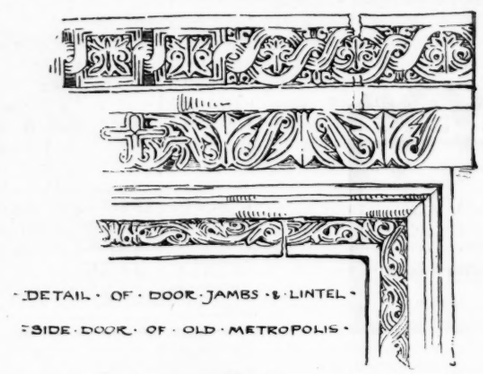


Fig. 9.

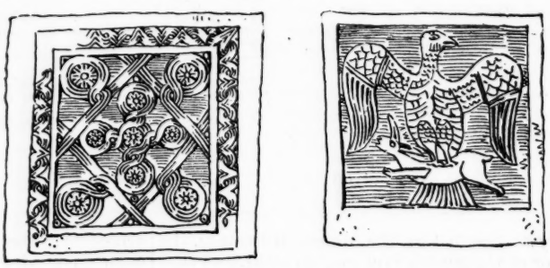


Fig. 10.

this has been the original covering. The drums of the domes are octagonal externally, and spring from a square die or plinth. They have a window in each face, and on each angle is an attached shaft terminating with a cap, and having a projecting gurgoyle over. The dome-windows have stone jambs and double tile arches with a marble coping over, taking the line of the arches. These window-heads cut up into the sphere of the dome-roof. Lenoir cites St. Theodore's as the only instance he knew of a dome of this kind with two-light windows in it. The roofs of these domes are tiled also. The walls of the apses stop a little short of the height of the main-wall heads, and have hipped roofs.

Although in other parts of Greece we have many instances of the multiplication of small domes grouped round the central one, in Athens itself there is no example.

The Church of St. Theodore has a belfry of three openings over its south gable. This is a late addition. Greek churches had originally no bells, the people were summoned to worship by the striking of wooden planks or thin slabs of iron or bronze. Bells were not introduced into the East till after the middle of the ninth century, when the Venetians presented a peal of twelve to the Emperor Michael, but it is unlikely that they came much into favour for a long time after this.

The Kapnikarea church has additions to the north and west of considerably later date; that on the north takes the form of a smaller church or chapel of an unpretentious character, and having a small dome over the centre. The western addition is a kind of exonarthex or porch. Its elevation presents a continuous series of four similar gables pierced by single windows, and having a somewhat elaborate arrangement of tile ornamentation. Under the two central ones are double openings, each divided by a circular column, and arched over. They have probably been open originally, but the level of the external ground has risen in the course of the centuries to over 4 ft. above the internal floor level, and they have been filled in and glazed to serve as windows. On each side are two simple arched openings. At the south end, on the side, is a projecting gabled porch supported on two pillars, and with a square-lintelled doorway under, which now forms the main entrance to the church.

This addition is built in conformity with the rest of the building, and harmonises with its general detail. It may probably date from the fourteenth or fifteenth centuries.

The Metropolis church (see lithograph) is perhaps the most interesting in Athens. Topographers have identified its site with that of the ancient serapeium.

Couchaud dates it from as far back as the sixth century, but Buchon conjectures that it was built by the Frankish Dukes in the beginning of the thirteenth century, as an expiatory offering for certain acts of extortion practised on the Greek clergy, and he claims to find amongst the numerous Byzantine carvings on its walls the arms of the French Dukes of Athens and the Morea.

The building is very small, the frontage measuring only 24 ft. across. It is built entirely of marble, the lower part of large blocks removed from an ancient edifice, the upper of carved slabs of all kinds.

Mixed up together are details of Greek and Roman times and carvings of the Christian era; amongst them are Greek steles, some built in on their sides, others upside down, pieces of carved friezes and cornices (fig. 9), Corinthian capitals, cofferings, pediments, &c. Here also are Byzantine panels covered with grotesque animals, others with the cross forming the central motive, and surrounded with interlacing or flowing ornament (fig. 10). In the arrangement of these slabs on the walls much ingenuity has been displayed, a wonderfully symmetrical composition has been made up from this collection of odds and ends, and the result is not unpleasing.

Most of the pagan carvings have been inscribed with crosses, and thus they seem to have been fitted for use in a Christian church. Many small crosses have also been cut on the plain slabs, and it is possible to count on the exterior of this one little building over sixty crosses carved in the marble.

On the west front is a portion of a frieze of perhaps the third century B.C., representing the labours of the months and with them the signs of the Zodiac. This is probably the only Christian church in the East which shows on its façade decoration of this nature. Lenoir tells us that the plain surface of the lower part of the external walls was decorated with frescoes painted on the coating, which had been put on the walls for this special purpose. When he visited the church there were still remains, on the south wall, of a large St. George on horseback and of several other figures. This external painting was, we can hardly think, the original intention of the builders, and must have been added at a later time.

The plan of the church is one of the most beautifully-proportioned of its kind. It has only one projecting apse at the east end, the dome is supported on four square piers, and the narthex is very wide in proportion to its length. The doors from the narthex into the church have carved jambs and lintels. On the jambs of the central doorway is represented a flowing vine with birds at intervals picking the grapes. They still retain indications of colouring.

This church served as the Cathedral of Athens till the year 1827. When Couchaud saw it it was used as a library, and there were still to be seen considerable traces of its old internal decoration, but it has since been restored and these have been painted over.

We now come to speak of another church, which differs from those already mentioned and from all the others in Athens. It is known as the Church of the Holy Apostles, and is situated on the lower part of the northern slope of the Acropolis, between the stoa of King Attalus and the Areopagus. The plan (fig. 11) is that of an octagonal church,

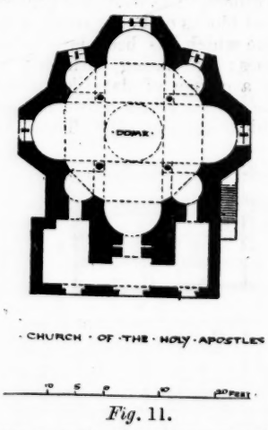


Fig. 11.

with apses to each of the four principal sides, and smaller ones between, and over the centre is a dome. The main entrance was originally through the western apse, and there was a narthex butting on to the west end, this probably being a later addition. Unfortunately, within the last few years the entire original character of the west end has been destroyed, the apse and narthex have been cleared away, and a new nave like a huge barn has been added, spoiling the whole building. Lenoir shows the old arrangement, and we have reproduced it from his plan. There are some interesting geometric coincidences in this church. A circle struck from the centre of the dome passes through the centre of all the apses. The radius of this circle is equal to one diameter of the large apses plus the radius of one of the small ones. The width of the small apses with the

piers on either side added is equal to that of the larger ones. From the centre of the four pillars supporting the dome to the centre of the small apses is one-half the diameter of the large ones, and the total external width over the apses is four of the large diameters.

If we knew the original level of the floor we might possibly find that the heights also worked out in proportional relation to the plan.

The eastern apse is emphasised by having a three-light window, while those in the side apses have only a single mullion.

This building is now used as an ordinary place of Greek worship, for which its plan is quite unsuited, and an iconostasis has been run across in front of the two easternmost pillars. It is said to be the old Baptistery of Athens, and is supposed to have had an octagonal font in the centre under the dome, like the baptisteries of the West. It would be interesting to know if any trace or remains of this font still exist beneath the present floor.

Externally it has many similar characteristics to the churches already described. The walls are built of Poros stone and tiles, but in this case each horizontal stone course is divided by a zigzag band in place of a single row of tiles; vertically between the stones are curious arrangements of shaped tiles in the manner of the band at S. Nicodemus. These are said to have a symbolic religious meaning, some Greek archæologists holding the theory that they are signs representing scriptural words and texts.

The octagonal form of the interior becomes subordinate, in the arrangement of the lines of the exterior, to that of the cross which spreads itself out on four sides from the central dome, with a gable at the end of each limb. The main apses abut on to these, the secondary ones being roofed over at a lower level, and looking as if filling in the angles of the cross.

Apses to side transepts are not usual, but they are sometimes found, as in the church of S. Elias at Salonika, which dates from the beginning of the eleventh century. They are more common in the Armenian churches.

Of the churches of the Western or Basilica form of plan we may mention the following—the Church of the Virgin of the Great Monastery (fig. 12), and those of St. Andrew,

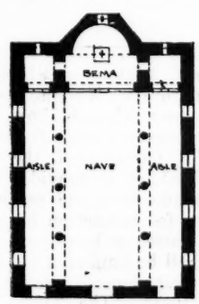


Fig. 12.

St. Philip, and St. John the Precursor. Of the four the first is the best preserved, but many of its most interesting features have been swept away during a recent restoration. The others are in a very ruinous state, only portions of the walls in some cases remaining, but it is still possible to learn from them many facts worthy of notice.

They are undoubtedly of Frankish times, thirteenth century or later, and have generally a nave and aisles of from three to five bays; at the east end is the bema, with projecting apsidal end and its parabemata, which sometimes have also projecting apses, but often mere semi-circular recesses in the east wall instead. Walls with communicating openings divide these, and towards the nave and aisles they are spanned by arches, under which was the ikonostasis. The roofs of the nave and aisles were usually of wood, and, where so, have long since disappeared. The fact of the Church of the Virgin having a barrel-vaulted roof accounts for its present good condition. The Church of St. John has a square bema, with a groined and vaulted roof, and no apse. This is the only example of this form in Athens.

In the windows and doors we find the ogival or pointed arch in general use.

These churches have no narthex, but the west walls show traces of wooden lean-to porches to protect the penitents and others from the burning rays of the sun and from the rain.

In front of the Church of St. Andrew are indications of an atrium, which has been cleared away in the formation of the present street. This church also contains on its ruined walls the remains of interesting frescoes which through constant exposure to the weather are gradually becoming more and more faint, and will soon altogether disappear. The west ends show the lines of the nave and aisle roofs, the central part forming a gable pierced by a two-light window and ornamented with carved slabs or glazed plates let in.

There are three doors, a central one into the nave and side ones to the aisles. They have plain jambs and lintels with arches over.

Above the central door is a canopy on corbels, under which is a fresco of the patron saint. The Church of the Virgin differs from the others in some important respects (fig. 13).

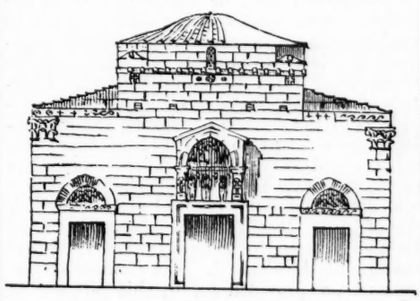


Fig. 13.

The roof of the nave does not finish at ends with gables, but is hipped back, the front wall showing a set-back as well 2 ft. or 3 ft. below the line of eaves; the corners are splayed away, and this shows internally in the main vault as a small angle pendentive; immediately under the eaves at each end is a small window; apart from these the church entirely depends for light on the side windows in the aisles. The bema roof is slightly lower than that of nave, and at the end of it is the apse. Under the canopy of the western door, in addition to the figure of the Panagia supported by the two archangels below it, are a series of fathers of the church. The walls, which formerly showed their stone and tile construction, are now plastered over and painted in yellow and pink strips.

In addition to the churches there are in Athens, on the Acropolis and in the National Museum, where a mediæval room is in course of being arranged, numerous valuable fragments of architectural detail of all descriptions and periods which, when sorted out and put into some kind of order, may help to clear up points, which are still hopelessly dark, to the student of Christian archæology in Greece; and there is even now, time, by a little judicious expenditure and oversight on the part of the authorities in Athens, to rescue much from needless destruction, and to stay to some extent the effacing hand of time on the many interesting relics of these times which still exist there.

Important as are the churches, in Athens itself, those in other parts of Greece are not less so. Around Athens, within the distance of a few miles, are several of no mean merit. The Monastery of Kaisariane has a good church of the second period, with a fine series of frescoes of the thirteenth or fourteenth centuries, which are in good preservation, and will well repay careful study. The church has several points worthy of notice, such as a dome over the narthex and an atrium in front. On the other side of Hymettus, at Teraka, are three others. There are several more in different parts of the Attic plain; and west of Athens, on the old sacred way to Eleusis, in the picturesque pass which runs through the range of Ægaleos dividing Attica from the Thriasian plain, is the beautiful church of the Monastery of Daphne, with its fine mosaics sadly ruined through the vandalism of the Turks and the effects of earthquakes. The plan of this church is somewhat similar to that of S. Nicodemus, in Athens, but without the women's galleries. Its walls have been lined with precious marbles, a few traces of which remain in places, especially round the bema, in the upper part of which is a splendid piece of marble mosaic panelling. Several large sarcophagi found here, with fleur-de-lys carved on them, seem to point this out as being the burial-place of some of the Frankish dukes. Adjacent to the monastery on the hillside is a small chapel of more purely Western character, with a crypt containing several tomb chambers, which have all been rifled long ago.

Further afield, at Chalcis, in Eubœa, we find remains of what is perhaps the earliest church now existing in Greece. It has been a fine basilica of the Ravenna type, and of contemporary date, viz., sixth century. The Cippolino marble columns and the beautiful carved caps, which may still be seen, attest its former grandeur. Added on to it are chapels with groined and vaulted roofs, probably built during the Venetian occupation.

Near Livadia, in Phokis, is the monastery dedicated to the memory of St. Luke, a renowned Greek hermit who lived in the early part of the tenth century, and who died and is buried here. It has two churches, built shortly after 950, it is said by the Emperor Romanus II. They are both interesting, and the larger one, with its rich mosaics and marble linings to its walls, is the finest specimen of its kind in Greece. Their architectural characteristics differ in many respects from those of the Athenian churches, and happily the buildings themselves are as yet practically unrestored, although there is great danger of their suffering from the ignorant meddlesomeness of the monks, who have recently demolished a porch of the sixteenth century, their excuse being that it did not form part of the original buildings. However, of these churches, and of the many beautiful ones at Mistra, near Sparta, which was for long the seat of the Byzantine governors of the Peloponnesus, and of others scattered about in different parts of Greece, we hope to speak more in detail at a future time. Suffice it now to remark that the work of collecting authentic records of these has yet to be done, and, as every passing season leaves behind it traces of the destroyer's ruthlessness, all encouragement ought to be given to the School at Athens which, with praiseworthy foresight, has allotted to itself the task of getting together before they perish for ever, a complete series of memoranda and drawings of the Byzantine and Frankish monuments of Greece.

Paris Exhibition Awards.—By a mistake on the part of the writer of "Last Notes on the Paris Exhibition" (*Builder*, Nov. 16), Mr. Skelsey's "Adamant" Portland cement, and Messrs. Francis & Co.'s cement, were mentioned as not having received medals. Mr. Skelsey's silver medal and Messrs. Francis & Co.'s gold medal were, in fact, duly reported in our list of awards to English exhibitors, printed in the *Builder* of Oct. 5. The mistake in the recent article, which we regret escaped our notice, arose from the fact that a number of exhibits were labelled as having received awards, and the writer of the "Notes" assumed that those not so labelled had been passed over. Messrs. Francis & Co. also state that it was they, and not the other cement firm of the same name, who exhibited the Parian cement and scagliola mentioned in the article.

NOTES.

THE recent exposure of the manner in which builders' work has been done at some of the London Board Schools, which has been seized on with such avidity by some daily papers always delighted to pose as moral reformers, is, we fear, a not unnatural outcome of the principle (a combination of hurry and economy) on which the building work of the Board has been for many years carried out. At the time when there was an attack made on Mr. Robson by some members of the Board in consequence of defects found in schools built nominally under his supervision, we remarked on the total impossibility of ensuring good building under the system which the evidence disclosed, of planning and specifying schools at railway speed, with the utter impossibility that the responsible architect of the Board, having (as he said) "only one brain," could really control all the buildings, even though he is a man with quite exceptional power of getting through work. Given an immense building business to be carried out in the shortest possible time, and with an architect's staff cut down to the very lowest limit possible for preparing the plans at all, and with more buildings going at one moment than the principal could keep any eye upon except by deputy, and there is of course the chance prepared for unprincipled people to make advantage to themselves out of the work, with the additional temptation arising out of the acceptance of the lowest possible tenders that can be got. Unless the School Board were charitable enough to assume that all mankind of the contracting order were entirely trustworthy persons, who could never succumb to any temptation to feather their own nest, there was a way left invitingly open for misdemeanours in building. We do not think that the London School Board, in its corporate capacity, can escape the censure of having indirectly contributed, by a bad system and an ill-judged striving after economy, to the kind of results which have caused such a scandal. The particulars mentioned in the report (given in another column) about Woodland-road and Salter's Hill schools are of course disgraceful to whoever is directly responsible for them, and it does not appear that any excuse can be offered for the worst faults mentioned; some minor matters we imagine have been exaggerated, and of course the daily papers have made the worst of it; they enjoy doing that. Messrs. Wall have sent us a letter which, as it has appeared in various daily papers, we must decline to give space to, but we have read it carefully. Some of the explanations given in it as to minor points appear to set matters in a different light; but in regard to such a serious thing as the composition of the mortar, we observe that while Messrs. Wall assert that they sent good sand on to the site, they do not attempt to deny the fact (which we presume is undeniable) that bad mortar was used, nor do they offer the slightest suggestion as to how it came about. They state that the clerk of works made an exhaustive reply to the charges, which the School Board have not published. If so, his reply ought to be published, as one means towards getting at the truth, which we evidently have not got to yet. If the facts as stated in the Works Committee's report are correct, it is evident that the *onus* must rest either with the contractors or their employés or with the clerk of works; and the latter must either have been negligent or have been taken in; under either of which suppositions he is responsible, in one sense or another. It is a bad business, and we ought to have the means of getting to the bottom of it.

EVERYBODY with any perception of logic must have seen that the case of Mr. Gibbs against Lord Grimthorpe in regard to the St. Albans faculty could not have ended otherwise than it has. The case was argued of course merely on legal grounds; and with every sympathy with Mr. Gibbs's well-meant attempt, it must have been evident from the first that his position was untenable, and that a faculty to restore the Abbey could not be held to exclude certain parts of it because they had not been specially named. So we shall now see, probably, the last remaining portions of one of England's greatest historic buildings covered up with the botching of a quack architect and his contractor. The real cause of all this being possible is the total want of a cultured public opinion about architecture on the part of the English press and the English public. In France such a thing would be impossible, for popular opinion, to say nothing of State regulation, would not allow it. In England, by the small section of the general public who pay any attention to the matter, it is only regarded as a joke.

THAT the London County Council do not slowly profit by their experiences of their first year of office clearly appears in some of the "miscellaneous powers" sought to be secured in a Bill for next session. These include the following objects: — To exempt their members from serving on juries; to confer further powers with regard to the purchase of lands in connexion with improvement schemes under the Artisans' and Labourers' Dwellings Improvement Act, 1875; to authorise them to establish one or more places for the reception of unidentified dead bodies, and to make by-laws and regulations in respect thereof; to enable them to maintain or subsidise a band or bands to play in the different open spaces under their control; to enable them to prosecute inquiries and negotiations relative to markets and water-supply; to empower them to administer oaths in certain cases of applications for licences; to provide as to the method of signing and approving plans referred to the Building Acts Committee; and to enable the "City" councillors to act in certain cases wherein they are at present disabled under section 41 of Mr. Ritchie's Act of 1888. It will be remembered that Lord Rosebery referred to these restrictions at a recent meeting of the Council. The Council's local measures, as provided for by this Bill, are of no great magnitude. They comprise a rebuilding of the iron bridge which spans Bow Creek, joining the East India Dock-road and Barking-road, with subsidiary works at that spot—the West Ham Corporation and the Essex County Council to contribute to the cost thereof; and the acquisition of Brockwell Hall or Park, lying between Norwood-lane and Lower Tulse-hill, with contributions from the Vestries of St. Mary Lambeth, St. Mary Newington, and St. Giles Camberwell. It is reported that towards the purchase-moneys of 122,000*l.*, the following amounts are promised: — Lambeth, 20,000*l.*; Newington, 5,000*l.*; Camberwell, 6,000*l.*; the Charity Commissioners, 25,000*l.*; London County Council, 61,000*l.*; and private donations, 2,500*l.*; thus leaving a balance of 2,500*l.* still to be met.

THERE seems to be some considerable difficulty in finding an adequate and suitable water-supply for Brussels. Numerous projects have from time to time been brought forward, but objections in one form or another have been raised in respect to all the more serious of them. The great interest taken in the question by scientific bodies and the public generally indicates that the inhabitants of the Belgian metropolis have nearly had enough of the fluid supplied from the present heterogeneous sources. On the one hand we hear of high-sounding projects, deriving the water from elevated ground in the south-eastern part of the country, and purposing to feed all the more important towns *en route* to the capital—a scheme which very much reminds us of certain ambitious proposals to supply London and towns in the midlands, only that in our case we should, at any rate, have a copious supply to draw from, whereas it appears that in regard to theirs, the Bruxellois are in some doubt as to this point. On the other hand, we have now before us a more modest, if not a more satisfactory, proposal by the well-known Belgian water-engineer Captain Verstraete. The essential features of this scheme are the construction of three very long tunnels in water-bearing strata at some depth from the surface of the ground, after the manner of the usual "galerie de drainage" methods. All three are to be driven in an east and west direction, two draining the system of the Mehaigne, which river at present runs into the Meuse at Huy; and the third along the valley of the Geer, which latter stream, taking a north-easterly direction, passes through Tongres, and joins the Meuse at Maestricht. It is intended that the two first-mentioned "galeries" shall be constructed for the present wants of the city, and that of the Geer be held in reserve as a future supplementary supply. The question as to whether Captain Verstraete's scheme is feasible is now being discussed by competent authorities. In the meantime, we wonder why so little attention is being devoted to water-bearing strata nearer Brussels; it is a remarkable fact that when a question of general water-supply for a great city is raised, no matter where, the magnitude of the subject seems to enlarge the minds of authorities to such an extent, that anything like a simple proposal is shelved as not being worthy so grand an object. In such cases it is fashionable to look for a supply many miles from the place where the water is wanted, though, in the end, the more distant projects have generally to be discarded on financial grounds. Captain Verstraete' scheme may be all very well, but in our opinion the geological conditions of the water-bearing strata nearer the Belgian metropolis are infinitely more suitable and economical for the end in view. It yet remains to be shown why the present system of "galeries" to the south of the city cannot be extended, and small rivers being further taken advantage of, whilst the methods of distribution are susceptible of much improvement. But an unsatisfactory state of things must always obtain whilst the private wells in the lower part of the city are permitted to be sunk into the alluvium, the water in this instance simply being that of the dirty river Senne filtered through sands and gravels. In summer, the water from this source, as might be imagined, is always exceedingly objectionable, but it is difficult to move the Legislature in the matter.

THE case of Walker *v.* Hobbs & Co., reported in the November number of the "Law Reports," though short, is of some interest at the present time. By the twelfth section of the Housing of the Working Classes Act, 1885, it is provided that "in any contract made after the passing of the Act for letting for habitation by persons of the working classes a house or part of a house, there shall be implied a condition that the house is in all respects reasonably fit for human habitation." The Queen's Bench Division held that this gives a tenant a right to sue a landlord for damages, if, in fact, the house is not "reasonably fit"; that it does not only allow a tenant to repudiate a contract, but renders the landlord liable, as we have said, in damages. In the case in question some plaster had fallen from the ceiling and injured the wife of the tenant. The jury awarded 50*l.* damages. Without having the evidence before us it is impossible to say if this verdict on the facts was justified. At first sight it appears to be carrying the Act somewhat further than was intended. Be the facts, however, as they may, the enunciation of the above principle of the judges clearly is of great importance to landlords. Perhaps the poor professional man may justifiably inquire why he also should not be protected by the law, as much as his plumber or glazier.

ON the southern slopes of the Hartz Mountains stands the Kyffhäuser, a hill of some 1,400 ft. elevation. It is well detached, thus forming a conspicuous object for many miles, and is dear to the myth-loving German,

for it is from a cave beneath this hill that Charlemagne will one day rise to resume his sway over the German Empire. This is the site chosen for a national monument to the late Emperor William, and the details of the competition (which, however, is confined to German artists), with prizes of 300*l.*, 200*l.*, and 150*l.*, are now published. It is left to the competitors to submit either purely statuesque designs, or statues with architectural treatment, and the cost must be guaranteed not to exceed 20,000*l.* The jury consists of the sculptors Prof. Dietz, of Dresden; Eberle, of Munich; and Siemering, of Berlin; the architects Prof. Dr. Durm, of Carlsruhe, and Von Leins, of Stuttgart; and the painters Prof. Geselschap and Dr. Jordan, of Berlin. It is considered a hardship that models of the statue itself must be executed to so large a scale as 1 in 10, and it is not unlikely that this part of the instructions will be modified.

MAJOR BOTTICHER, a retired officer of the Prussian Army, having repeatedly attacked and thrown doubts upon the discoveries of Dr. Schliemann at Troy, Dr. Dörpfeld, Dr. Schliemann's faithful companion and assistant, has sent the following to the *Neue Freie Presse*:—"The excavations of Troy (Hissarlik) will be resumed on November 25, the necessary permit having been granted by the Turkish authorities. Major Bötticher is hereby publicly invited to be present, and his expenses out and back will be paid. The Academy of Sciences at Vienna has selected the architect, Professor George Niemann, as an impartial witness, and Major Steffen, of Cassel, will act in a similar capacity for the Academy of Berlin. We are prepared to open up any parts of the remains of Troy which may be desired either by Major Bötticher or by the two official witnesses. Should Major Bötticher not put in an appearance, the excavations will, of course, be resumed without him."

WE understand that the Glasgow Subway Scheme is to come before Parliament again (although twice rejected within three years), in the hands of the original promoters, who seem at all events to have faith in their own project. The idea is that of a double-line railway under the streets, describing a complete circuit of irregular form, and giving frequent passage to very light trains on a system of rope traction. The harbour is crossed in tunnel at one point and recrossed at another, as in last year's proposal; and this is a feature likely to tell against success, as, having already sanctioned one harbour tunnel of equally large proportions for ordinary traffic, which is now about to be commenced, Parliament will hesitate about adding to the number until after some trial of the pioneer undertaking. Powers are also sought to extend the suburban connexions of Glasgow Central Railway (an underground line in the hands of the Caledonian Company, the building of which is on the point of beginning), and from its western terminus to project a new line twenty miles westward to Loch Lomond shores, along, practically, the same route as that now, and so long, in the hands of the North British. A private company proposes a line of a light order of construction from Milngavie, which is at present a Glasgow suburban terminus, to the lake of Menteith, Perthshire; the West Highland Railway Company, whose line is now making, apply for certain plans, deviations, and minor additions to works and sidings; and elsewhere over Scotland generally, the new short railways at this time announced are numerous. The North British and the Glasgow and South-Western apply mutually for an endorsement of their plan of amalgamation, some time ago announced; while the Caledonian Company at the same time, on its part, asks to be permitted to absorb the Glasgow and South-Western itself, or to share equally with the North British in the property thus sought to be acquired. This presents a position of involved rivalry, which is unprecedented in the history of the great lines, and the working out of the final adjustment will be a matter of some difficulty. The Clyde Trustees propose the construction of a new graving dock, and several new roads; the Clyde Board of Lighthouses want extended margin for works in progress; and the Glasgow Corporation are introducing a bill for a comprehensive extension of the city boundaries, based on the report of the Royal Commission which sat last year.

AMONGST the illustrations to an article in our columns of Feb. 11, 1854, will be found that of a late seventeenth-century doorway (on the first floor) of No. 21, College-hill, Upper Thames-street. Writing to the *Athenæum*, "F." directs attention to this and the adjoining house, No. 22, which he boldly avers "belonged to the 'Zimri' Duke of Buckingham, and was sometimes inhabited by him." He makes no doubt that this,—the now Nos. 21–22,—is the original house; adding, "to which opinion I am guided principally by the staircase [of No. 21], which is a good specimen of the period." The staircase in question is commodious, certainly, and has a well-built hand-rail carried by single twisted balustrades; but it presents no very remarkable features besides. This, "F." says, is about to be removed, in order to gain additional space. The corresponding staircase in No. 22, by the way, seems as though it had been reversed at some later date, inasmuch as the wall panels now range crosswise with the flights of its steps. These two adjacent houses are clearly shown, with their divided court-yard, in Horwood's large scale-map of 1799, as lying between the old Cutlers' Hall, at the corner of Cloak-lane, and Whittington's almshouses north of St. Michael Paternoster Royal Church. The court-yard, being at a lower level than the house terrace, is entered through the two fine existing gateways on College-hill, eastern side, whereof No. 22 was photographed (1884) by the Society for Photographing Relics of Old London, *e curis* Mr. Alfred Marks. Each of the sister gateways is conspicuous for its heavy curved pediment resting upon large consoles, and overshadowing a sculptured head with a curtain, or mantle, and two massive floral wreaths. These features are also reproduced beneath the pediments of some carved doorways in the interior of No. 21. We learn that the vaults beneath the wine-merchant's premises between the two gateways are called Whittington's cellars. An old inhabitant of the parish reminds us that in this quarter he clearly remembers "Whittington's pump," hard by, as well as the set of privies which that worthy established by the river-side for porters and watermen. Whittington was buried in the Collegiate Church he had endowed, here, by the Queen's Wardrobe, to the Holy Ghost and St. Mary, which is now represented by Wren's St. Michael Paternoster in the (Tower) Royal. His almshouses (or college), were removed eighty years ago, to Highgate: their site is that of the Mercers' School, which migrated hither from Budge-row.

OUR contemporary's correspondent quotes Peter Cunningham,—second edition, 1850, *sub* Buckingham House,—who says, "part of the court-yard still exists." But he apparently fails to notice that Cunningham, whilst he places that "spacious mansion on the east side of College-hill," quotes Strype, who says it stands "almost over against the said church (St. Michael's, College-hill)"—that is, on the western side of College-hill. Moreover, Cunningham, *sub* College-hill, again stultifies himself in writing (second edition) that "the second and last Duke of Buckingham of the Villiers family lived in a large house on the west (*sic*) side of College-hill, towards the top." In Hatton's work (1708) Buckingham House is stated to be on the eastern side of the street. Hatton describes it, as also does Strype, as being then or lately occupied by Sir John Lethieullier, the eminent merchant. But Noorthouck's map, 1773, marks the house on the western side, by where is the Newcastle-court of Horwood's plan. Of these two houses, No. 21 retains its red-brick front and cornice; No. 22, to the north, is stuccoed; and, if they were originally one, the rows of windows are not, at the present day, symmetrical. Since the foregoing was written, Mr. Marks has addressed a reply to the *Athenæum* (of last Saturday) to say that inquiries made by him at the time of taking the photograph failed to establish the actual identification of the houses with the residence of the Duke of Buckingham.

THE General Manager of the London and North-Western Railway has been undergoing quite an ordeal at the Railway Rates Inquiry before the Board of Trade. Mr. Findlay has again been under examination this week, and has been questioned by representatives of the most diverse trades and industries. One sitting, which opened with cattle traffic, concluded with the iron trade,—hardware, fish, meat, and several other descriptions of traffic being dealt with during the day. Each and all are assured that the railway companies have no intention of disturbing the present rates, but it is being made more and more evident that the difference between these and the proposed maximum rates is, in many instances, very great. The companies seem to have made up their minds to put a most literal interpretation upon the "preference rate" clauses of the Act of 1888. "In the compilation of the schedule," said Mr. Findlay, "we took care that smaller traders should not be sacrificed by undue advantages being given to the greater." In fact, the railway companies contend that the granting of truck and train load rates would be contrary to the spirit of the Act, and they have, therefore, made no provision for such consignments. Train loads, however, are very rare in this country, and would, perhaps, be no less so even if lower rates were offered. The granting of truck rates, on the other hand, would probably result in more full loads (and, consequently, fewer half-empty wagons) being conveyed, and this would be an advantage to both parties.

THE citizens of Wakefield, says the *Athenæum*, are minded to celebrate the approaching three-hundredth anniversary of their free grammar-school by rescuing the original school-house from its present ignoble uses as a furniture-broker's store. The old buildings, bearing a bust of Queen Elizabeth, the founder, with her motto, *Semper Eadem*, stand at the top of Northgate. This endowment claims amongst its distinguished scholars Dr. John Radcliffe, famed for his liberal endowments at Oxford University; John Potter, Archbishop of Canterbury (1737-47); Dr. Richard Bentley, the famous Master of Trinity College, Cambridge, during the period 1700-42; and Joseph Bingham (died 1723), author of "Origines Ecclesiasticæ," which notable work he completed in his rectory at Havant, near to Portsmouth. Possessing an income of over 3,000*l.* a year, this foundation was re-modelled under a scheme of the Charity Commissioners in 1875-6, and has lately been removed into premises erected for the West Riding Proprietary School, founded in 1832, and of which a view will be found in "Fullarton's Gazetteer."

CONCERNING the Passion Plays, which are to commence in June next at Oberammergau, we are informed that the construction of the theatre is already well in hand. The stage is 126 ft. wide; the arcades, the city gate, and the house of Pilate are finished; and 4,000 seats, partly under cover, partly in the open air, are being put up now.

IN the *Builder* for August 24 we published illustrations of the first and second premiated designs in the Richmond Municipal Buildings Competition, by Messrs. Elkington & Son and T. Verity respectively. The award of the premiums was made in accordance with the judgment of a competent pro-

fessional assessor, Mr. Edmeston, who appears to have made the decision in a perfectly fair spirit, keeping in mind the important consideration of the relation of the designs to the specified cost, often overlooked in deciding competitions. However, the competition has ended, as we see from a newspaper report of the last meeting of the Richmond Vestry, as vestry competitions generally do end,—viz.: by the throwing over of the originally premiated candidate, and selecting a design which was not placed at first, that by Mr. Ancell, submitted originally under the motto "Bon Espoir." What (if any) motives for this there may have been beneath the surface we cannot of course understand; the ways of Vestries are mysterious. On the face of it the reason seems to have been that a majority of the committee admired Mr. Ancell's elevations more than those of the premiated design, and we expressed an opinion in favour of his design and detail as one of the more interesting and picturesque among a very poor set of designs architecturally; but we also said that "the plans were terribly cut up and wanting in architectural simplicity and directness," and we characterised the plans of the first premiated design as being "excellent, and the elevations not so very much worse than some of the others.' It appears that in the first instance there was a recommendation brought forward that Mr. Edmeston should be invited to examine the first premiated design along with that of Mr. Ancell, but an amendment to adopt the latter at once was carried by a majority. No statement is given in the report before us as to the reason for the first proposal; the reason against it seems to have been that it would have involved a special fee to the assessor, and that the Vestry were competent to judge for themselves between two plans, though (as seems to be implied) a greater number would have bewildered them. We do not see the logic of this; and certainly the result is that they have selected an inferior plan, though a more pleasing design. The Rev. C. F. Coutts moved, and spoke in favour of, an amendment that the matter should be adjourned until they had Mr. Edmeston's opinion on these two plans. This, however, they had practically already had, as the assessor had all the plans before him originally. They would have been much wiser if, having had the benefit of the assessor's superior knowledge, they had adopted his decision. The unfairness about the thing is that the "Bon Espoir" design had been set aside in the first instance as being manifestly outside of the stipulated cost. In that case it ought to have been regarded as out of court. Public bodies have no moral right to advertise for designs at a certain cost, and then to take one which was over the stipulated cost, because they have subsequently resolved to spend more money. That is deluding the competitors. The Vestry had a right to decline the assessor's decision, if there were good and reasonable grounds for doing so; but they had no moral right to set against his choice a design which contravened their own original conditions. But it is just what may be expected in this class of competitions. People are said to need a long spoon who eat with the devil; and architects who go in for Vestry competitions are in much the same case.

Royal Institution—The Christmas lectures (adapted to a juvenile auditory) will this year be given by Professor A. W. Rücker, F.R.S. (Professor of Physics in the Normal School of Science and Royal School of Mines), on "Electricity." They commence on Saturday, Dec. 28.

The Sanitary Institute.—At an Examination held for Inspectors of Nuisances, on Nov. 21 and 22, sixty-nine candidates presented themselves. Questions were set to be answered in writing on the 21st, and the candidates were examined *vivâ voce* on the 22nd. Thirty-nine of the candidates were certified to be competent, as regards their sanitary knowledge, to discharge the duties of Inspector of Nuisances.

THE ANNUAL REPORT OF THE LOCAL GOVERNMENT BOARD.

THE "Eighteenth Annual Report of the Local Government Board, 1888-89," just issued,* was presented to Parliament in June last, and covers the twelve months from April 1, 1888, to March 31, 1889. As was to have been expected, the Report devotes a considerable number of pages to what it justly characterises as the most important event of the year in connexion with local government, viz., the passing of the Local Government Act of 1888, which constituted the new County Councils. This part of the Report, in fact, is an official commentary, by the President of the Board, on the scope of that important measure, not only in the form in which it passed through Parliament, but in the form in which it was introduced. "The provisions as to District Councils were not proceeded with owing to want of time," we are told, but we do not find in the Report any promise that the Government intend to proceed at once with a measure for establishing these District Councils. Until these District Councils are established it cannot be said that the latest instalment of Local Government reform is complete.

The second section of the Report deals with questions relating to the relief of the poor and the amount of the poor-rate. The statistics of pauperism show that on the 1st of January last the total number of paupers of all classes in England and Wales in receipt of relief was 817,190, of whom 204,758 were indoor and 612,287 outdoor paupers, while 145 received both indoor and outdoor relief. As compared with those of Jan. 1, 1888, these figures show a decrease of 1,376 indoor and 12,780 outdoor paupers, and a decrease of 7 in the number of those receiving both indoor and outdoor relief. The population of England and Wales, as estimated by the Registrar-General, was, the Report tells us, 28,247,151 in the middle of the year 1887, and 28,628,804 in the middle of 1888. Taking these figures as the basis of calculation for the purpose of ascertaining the proportion to the population of the paupers relieved on the 1st of January of the two years 1888 and 1889 respectively, it appears that the total number of paupers amounted approximately in the former year to 1 in every 34 persons, and in the latter year to 1 in every 35 persons. This slight diminution in the number of paupers, taken in conjunction with the signs of a revival of trade, some of which are mentioned in the Report, while others are apparent to outside observers, is of hopeful augury. We cannot go at any length into the voluminous statistics of pauperism which the Report contains, but we may give one or two figures which are full of suggestiveness. "The county which contained the largest proportion of paupers on the 1st of January last was Dorset, in which no less than 48·4 out of every 1,000 of the population were in receipt of relief. The county in which there were fewest paupers on that day in proportion to the population was Lancashire, where they amounted to only 19·3 per 1,000." In the metropolis the proportion which the number of indoor paupers bore to the population was 14·4 per 1,000. In Wales it was 4·0. The cost of the relief of the poor for the year ended on March 25, 1888, was 8,440,821*l.* This amount represented an average charge of 5*s.* 11¾*d.* per head on the estimated population for that year (being 1¼*d.* per head more than in the preceding year), and an average rate of 1*s.* 1·6*d.* in the pound on the rateable value of the property liable to contribute to the poor-rate.

"Public Health and Local Administration" is the subject of the third section of the Report. From it we learn that since the constitution of the Local Government Board in 1871 it has sanctioned the borrowing, by Urban and Rural Sanitary Authorities, of no less a sum than 41,114,990*l.* By far the greater proportion of this expenditure, or upwards of 35,000,000*l.*, has been sanctioned for the purpose of sanitary improvements in Urban districts, to be executed under the provisions of the Sanitary Acts, the Public Health Act 1875, and local Acts and Provisional Orders. During the year covered by the Report, the Board directed local inquiries to be held by its Engineering Inspectors in 552 cases. After several pages, summarising a great deal of the administrative work of the Board in this connexion, we come upon the following paragraph:—

"Section 156 of the Public Health Act, 1875, provided that it should not be lawful in any Urban District, without the written consent of the Urban Authority, to bring forward any house or building forming part of any street, or any part thereof, beyond the front wall of the house or building on either side thereof. In the case of Williams, App., *v.* The Wallasey Local Board, Resps., 16 Q.B.D. 718, it was held by the Queen's Bench Division that this section did not apply to new buildings in course of erection upon land never before built upon. In consequence of this decision, an Act called the Public Health (Buildings in Streets) Act, 1888 (51 & 52 Vict., c. 52), was passed during the last session, by which Section 156 of the Act of 1875 was repealed, and its provisions were in substance re-enacted in such a form as to render them applicable not only to the bringing forward but also to the erection of any building in a street."

After giving further details of administrative work, this section of the Report touches on the metropolitan water supply, as to which we are informed, on the authority of reports by the Examiner under the Metropolis Water Act, 1871 (Major-General A. de C. Scott, R.E.), and the Analyst (Professor Frankland, F.R.S.), that the high standard of purity attained in recent years was generally maintained in the year under review. General Scott, in his Annual Report (which forms one of the appendices to the Local Government Board's Report), not only gives full particulars of the present supply, but some forecast of the future requirements of the metropolis. The average daily supply per head of the population during the year for domestic purposes was (according to the Report) nearly twenty-four gallons, a quantity which is, the Board remark, without doubt largely in excess of actual use, and suggesting that, "as is, in fact, the case," the waste must be very great. The average annual increase of population in the districts of the eight water companies is 149,146, nearly a quarter of this increase being in the district of the East London Company. General Scott pointed out in his last Annual Report* that the water supply of the north and east of London was entering into a critical stage, and he now calls attention to the fact that practically the whole of the volume of the River Lea is absorbed by the New River and East London companies for the supply of their districts; that, in addition, they derive about 15,000,000 gallons daily from wells, and the East London Company not more than 10,000,000 gallons from the Thames. Under these circumstances, to which we last year directed the attention of our readers, it is not difficult to see that, as the Report of the Local Government Board points out,—

"When the needs of North and East London have to be met a few years hence, the large additional strain will fall on the supply derivable from wells, unless the Thames be still further drawn upon, or unless resort can be had to sources outside the Thames and Lea valleys; and it necessarily becomes a more important question, year by year, whether the wells will long continue to be equal to the growing demands upon them. As General Scott indicates, it must not be forgotten that to abstract underground water by means of wells tends to impoverish the river that is fed from water-bearing strata, and, consequently, as the existing underground supplies are more and more drawn upon, the question of finding new gathering grounds becomes more urgent. General Scott calculates that within the next five years the New River and East London Companies may have to double their present daily supply from wells in order to meet the maximum demand that may be made upon them. The feasibility of finding a sufficient supply from this source is in course of being ascertained, as regards the populous district of the East London Company, by the construction, on a considerable scale, of new works† designed to tap the water-bearing strata to which the company have the right of access in the Lea Valley, and it is to be hoped that the result of these works will be to make it clear whether there is a prospect of abundant water in this locality before actual need arises. It would seem that there is no necessity to anticipate within an equally short period a similar difficulty as regards those districts in the east of the metropolis which are supplied from the Thames, but, sooner or later, the problem of the whole water supply arising from the Thames basin must evidently come prominently forward. At the date, four years hence, to which General Scott's forecast relates, the minimum discharge of the Thames, even in a dry season, may be expected to afford the means of satisfying the greatest possible requirements of the water companies without unduly

* London: Eyre & Spottiswoode; Edinburgh: A. & C. Black; Dublin: Hodges, Figgis, & Co.

* See *Builder* for Dec. 1, 1888, p. 394.
† Described in the *Builder* for July 13 last, p. 30.

lowering the river; but at the same time the total supply of the metropolis will then approach four-fifths of the amount which, according to the estimate of the Royal Commission of 1867, could reasonably be expected from the entire basin of the Thames."

As we have pointed out on a former occasion, this is a somewhat alarming prospect, and we trust that the London County Council is not losing sight of the matter, which involves a problem the timely and adequate solution of which is of the utmost importance. Meanwhile, it is satisfactory to find that the number of houses receiving a constant supply is continually on the increase, for the intermittent system is attended by sanitary dangers from which the constant system is free. As to the question of waste, the East London Company find that the effect of inspection in the suppression of waste, detected by a Deacon's meter, is very transient, and that such waste is renewed to its full extent within a few weeks. On the other hand, it was ascertained by the Southwark and Vauxhall Company that, although the provision of a constant supply was followed by a temporary increase in the consumption of water, in a short time a permanent diminution took place. This was proved as regards their district by a series of carefully-conducted observations continued for a considerable period, and it seems to show that, with due attention to fittings and proper arrangements for supervision, the extension of constant supply is not open to serious objection on the ground that it favours waste. General Scott sums up in favour of the constant system, under proper conditions.

With regard to the question of the purity of the water, we may quote one paragraph from the Report:—

"Dr. Percy Frankland, who has for some time past been so good as to furnish us with periodical reports of his interesting experiments in bacteriology in connection with the London water supply, has now left London, and consequently his investigations into this subject will cease. They consisted of the development in a gelatine-peptone medium of the micro-organisms found in samples of water taken before and after filtration, and a calculation of the comparative amount of such organisms in the two samples. The results indicate the effect of filtration in ridding the water of certain forms of organic life; but it is impossible to be confident that all the organisms which constitute dangerous pollutions of water can be cultivated in the medium employed, or can be eliminated by ordinary methods of filtration. General Scott refers to the desirability of such modes of inquiry being continued and amplified. He points out that, even if the process as hitherto conducted cannot be trusted to give the material for valid inference as to the whole of the organisms present in water, it is desirable in the interests both of the consumers and the companies that the inquiry should be modified and extended in the hope of reaching a trustworthy test of purity. For such a test the power actually to measure the number and characterise the forms of life in water would be invaluable if it could be gained."

The fourth and concluding section of the Report deals with the subject of "Local Taxation and Valuation." From this part of the Report we learn that the outstanding loans of the 28,359 local authorities which come in some way or other under the control of the Local Government Board amounted, at the end of the year dealt with by the Report, to no less a sum than 186,821,642*l.* Of this grand total, 32,427,279*l.* have been expended on waterworks; 29,901,617*l.* on harbours, docks, and piers; 29,021,594*l.* on highways, street improvements, and turnpike roads; 18,389,376*l.* on sewerage and sewerage disposal; 16,812,398*l.* on schools; and 14,699,015*l.* for Poor-Law purposes. These amounts, of course, extend over a series of years, and are supplemental to the amounts raised by rates and directly appropriated to these and kindred purposes.

In conclusion, we may mention that the Report of 186 pages is supplemented by 554 pages of appendices in the shape of reports and returns, many of them of great interest to the sanitarian, and all of them important to local administrators and the public.

Sidcup Cottage Hospital.—We are informed that sixty-eight designs were received in competition for the Sidcup Cottage Hospital. A member of the Institute was called in to assist the committee in selecting the most suitable design. After several meetings, the drawings submitted by Mr. Sidney G. Goss, A.R.I.B.A., were selected. Mr. Goss has been instructed to prepare working drawings and to obtain tenders for the work forthwith.

THE LONDON COUNTY COUNCIL.

THE ordinary weekly meeting of the London County Council was held in the Council Chamber, Guildhall, on Tuesday afternoon last, Lord Rosebery presiding.

The Late Engineer.—The Standing Committee reported as follows:—"In accordance with the resolution of the Council on the 12th instant, your Committee have considered the question whether it is possible for the Council to make any provision for the widow or family of Mr. Gordon, the late Chief Engineer. We are advised that the late Metropolitan Board of Works had no power to make any grant of money to the widows or families of officials who died in its service, and that the Council has no more power than the Board had in this respect. This being the case, your Committee can only report that the Council has no power to make any provision for the widow or family of the late Chief Engineer." This was agreed to without discussion.

Checks on "Jerry" Building.—The first paragraph of the Building Act Committee's Report was as follows:—"Your Committee have proceeded upon the reference by the Council of the 12th instant that the Committee be asked to report (1) whether, in their opinion, the statutory provisions and the existing by-laws, as to the solidly putting together of the walls of new houses with mortar or cement, and as to the description and quality of the substances of which walls are authorised to be constructed, are carefully and fully carried out, under the supervision of the District Surveyors, by builders in all parts of the metropolis; (2) whether any fresh by-laws or instructions to the District Surveyors are necessary with a view of checking what is known as 'Jerry building.' Your Committee had already referred to a Sub-Committee the questions which are the subject of this reference, and they have also made representations to the Parliamentary Committee with a view to the amendment of the existing law in certain respects." This was received without discussion.

Charing Cross-road and the Site of the National Portrait Gallery.—The Corporate Property, Charities, and Endowments Committee submitted a report on the subject of the vacant land in Charing Cross-road opposite the site of the proposed National Portrait Gallery. The report referred to former proceedings of the Council on August 2 last, with reference to the matter, and proceeded to say that some oral communications passed in October between the Chairman and the Office of Works, resulting in the conclusion that each party was to act on the footing of the negotiations being at an end. The Report then went on as follows:—

"2. On the 1st instant the Council referred to this Committee and to the Improvements Committee to consider and report on the advisability of widening the approach to Leicester-square from Shaftesbury-avenue, by way of Green-street; widening the entrance to Charing Cross-road from St. Martin's-place; closing Hemming's-row, and adding the ground thus gained to the open space to the north of Hemming's-row.

3. The Improvements Committee desire to take a strip of the vacant plot, about 900 square feet, for the purpose of widening Charing Cross-road, but this Committee have not seen their way to recommend the Council to depart from the conclusion expressed first on May 14, and again on August 2.

4. On the 1st instant the Vestry of St. Martin's addressed us with the view of making an arrangement by which the Council should acquire so much of Hemming's-row as abuts on the south side of the vacant plot, and should throw the strip of about 900 square feet into Charing Cross-road, and should do its best to help the Vestry to acquire a strip of Crown land abutting on St. Martin's-place. This proposal appeared to us to be beneficial, if the Vestry could make a title to Hemming's-row, and on the 5th instant we returned them an answer to that effect. But, before any further step was taken, we sent to the Vestry information which effectually suspends their negotiations with us.

5. The information was that the Office of Works had made a fresh overture to us. On the 7th instant the First Commissioner wrote to the Chairman of the Council, saying that if the Council will agree to accept 7,000*l.* for the land, the Lords of the Treasury will submit a vote for that amount to Parliament. That offer entirely alters our position.

6. The view which has prevailed in our Committee may be thus stated. We are not actually bound by anything that has passed between us and the Office of Works, because negotiations never were finally concluded, and indeed were broken off some time in October. But we can hardly doubt that if the Treasury had been prepared to pay 7,000*l.* in August, the Council would have sold the plot to the Crown. They have, in fact, made the offer very soon afterwards, and before anything has occurred to alter the position of affairs, except the proposals of the Vestry, which are necessarily dependent on conditions that may never be performed. We, therefore, think it would be a becoming course for the Council to treat the matter as it would have treated it in August last.

7. Moreover, we think that the arrangement is beneficial to the London public. We should be glad to see the plot pass to the Crown, in whose hands it will be kept as an open space. The price of 7,000*l.* was the estimate of value made by our Architect about eighteen months ago, and given to us in June last, for the purpose of negotiation with the Office of Works. By selling to the Crown at 7,000*l.*, the Council will forego the chance of getting more at a auction, and our Architect advises that the progress of building in that quarter makes it probable that more can be obtained. But if the land is sold at extreme auction price, it must be used for such purposes as a builder can turn it to. And it seems to us more beneficial to the public to secure a more agreeable treatment of the plot, while obtaining the price which a few months ago we considered a fair one.

8. The Improvements Committee have proposed that a deputation, consisting of members of that Committee and of ours, should wait upon the First Commissioner of Works, with the object of submitting to him a plan to the following effect: That the above-mentioned strip of 900 feet shall be thrown into Charing Cross-road; that the Crown shall buy the remaining portion; that it shall have the prospect of acquiring the above-mentioned portion of Hemming's-row; and that it shall give up about 1,550 square feet of Crown land at the north-east of the National Gallery, to widen Charing Cross-road.

9. We agree that such an arrangement would be a good one, but we are reluctant to propose it to the Crown at the present juncture. We have no reason to believe that the Crown will part with any of the land attached to the National Gallery. We have no power to settle the destination of Hemming's-row. We hesitate to open the question of price, which was the difficulty in August last, and on which the Crown has now made a concession to us. We are afraid that if we do so, and if we also import into negotiations new terms, part onerous to the Crown, and part depending on the action of other authorities, we may lose altogether the advantageous position we have now got. We prefer the simple course of closing on the bargain which we originally contemplated, now that it is in our power, to an alteration of our plans for the purpose of obtaining a better bargain, which is not in our power now, and which may prove illusory.

10. For these reasons we have respectfully declined to take part in the proposed deputation. And, owing to this difference of opinion, it will be necessary for the Council to consider the matter, and to make an order on it. If it should think that the views of the Improvements Committee are to be preferred, we would suggest that the business will be facilitated by placing the matter wholly in the hands of that Committee. We now put the question into formal shape for decision by recommending:—

'(*a*) That the land be transferred to the Crown for the sum of 7,000*l.*, under conditions prohibiting building except with the consent of the Council.

(*b*) That this Committee be authorised to take all proper steps to carry the sale into effect.'

The Finance Committee raise no objection to the proposed transfer."

The consideration of this report was, by consent, postponed. The Report of the Improvements Committee on the same subject was as follows:—

"On 31st May last the Council passed the following resolution;—

'That it be referred to the Improvements Committee to consider and report on the advisability of widening the approach to Leicester-square from Shaftesbury-avenue, by way of Green-street; widening the entrance to Charing Cross-road from St. Martin's-place; closing Hemming's-row, and adding the ground thus gained to the open space to the north of Hemming's-row.'

In proceeding upon this reference, your Committee instructed the Architect to confer with the Architect of H.M. Office of Works, in order to ascertain whether the Government would be prepared to assent to the proposed widening, and upon what terms they would give up the required land; but on August 2 last, and before the Architect had had time to carry out these instructions, the Council authorised the Corporate Property Committee to deal with the plot of ground which lies to the north-east of the National Gallery, and a portion of which would be required for the improvement specified in the reference. On October 1 last your Committee, reporting upon the question of the improvement, expressed the opinion that it was a desirable one, and upon their recommendation the matter was referred to the Corporate Property Committee and to your Committee for consideration and report. The subject has accordingly engaged the attention of your Committee, and they have placed themselves in communication with the Corporate Property Committee. They have communicated to that Committee the suggestions which appeared to them best calculated to secure the desired object, and which are shown upon the plan submitted herewith. But your Committee are informed that the Corporate Property Committee have decided to recommend the Council to give its sanction to the sale to the Government, for the sum of 7,000*l.*, of the whole of the plot of land. Your Committee, however, are still of opinion that the improvement would be very desirable, and as their proposition is a very favourable one for the Government, they are of opinion that the actual sum to be paid by the Office of Works would be scarcely, if at all, less than that which they now offer, because since the proposition was made to the Government by the Corporate Property Committee, your Committee have suggested the absorption of a portion of Hemming's-row, which greatly enhances the value of the vacant land. Your Committee think it right to add also that the Valuer supports the opinion of your Committee as to the value of the plot. Your Committee have therefore to recommend,—

'That the Architect be instructed to confer with the Architect of H.M. Office of Works in order to ascertain whether they would be prepared to purchase, and if so upon what terms, the vacant plot of land at the southern end of Charing Cross-road, diminished by the small strip containing about 900 square feet which it is proposed to throw into the public way, but with the prospect of their obtaining possession of the portion of Hemming's-row which it is intended to close, and subject to the Government giving up a strip of their land (about 1,550 square feet) situate at the north-east of the National Gallery, which strip it is proposed to throw into Charing Cross-road; and that the Architect be instructed to report the result of his negotiations to the Corporate Property Committee and the Improvements Committee.'"

This report and recommendation, it was understood, would be considered *pari passu* with that of the Corporate Property Committee at the next meeting of the Council.

Disposal of the Surplus Lands of the Council.—The Corporate Property, Charities, and Endowments Committee brought up an important report, signed by their Chairman, Lord Hobhouse, on the question of the manner of dealing with land which came into the possession of the London County Council, as surplus land after the execution of street improvements. After discussing the question in its varied aspects, the Committee concluded by making the following recommendations:—

"I. That the Council should instruct the Committee to sell the land of the Council in preference to leasing it for ninety-nine years, in cases where there does not exist any special reason for leasing it.

II. That the Council should acquire power to keep superfluous land as open space whenever expedient.

III. That the Council should acquire power to apply to the purposes of Artisans' Dwellings land acquired under Improvement Acts.

IV. That the Council should acquire power to sell land, or demise it for any term of years for a fixed rent."

The consideration of the report was postponed for a fortnight.

Improvements in the City.—The Improvements Committee recommended,—

"(*a*) That all outstanding applications of the City Commissioners of Sewers for contributions be disposed of by the Council declining to contribute unless exceptional circumstances can be shown for any particular improvement having been carried out without the specific consent of the late Board, in which circumstance the improvement shall be considered on its merits.

(*b*) That all future contributions towards the cost of improvements in the City of London be upon the same footing, and be made in the same manner as contributions to improvements in other parts of the county.

(*c*) That a letter be addressed to the City Commissioners of Sewers accordingly."

This gave rise to a long discussion. Councillors representing the City, directly or indirectly, spoke in favour of an amendment to refer the matter back for further consideration, but this proposal was strongly combatted by many of the Councillors representing London outside the City, mainly on the ground that the City had obtained an extension of the Coal-tax, to which the whole of the County Council area would have to contribute. Ultimately the amendment was lost by sixty-six against to twenty-two for. One or two further amendments having been defeated, the report was agreed to.

Waterlow Park, Highgate.—The Parks and Open Spaces Committee reported, with reference to the new park at Highgate, which has been presented by Sir Sydney Waterlow, that they had made arrangements for the execution of the deed of transfer of the property on Dec. 16. In the meantime, they were considering what steps should be taken with regard to the ground. Their idea was to preserve as much as possible the present features of the property, and particularly all points of historical interest, of which there were many in connexion with the Lauderdale House section of the property. The Committee reserved their full report until they had made further inquiries on the ground, and the only recommendation they had at present to make was, "That the park be called 'Waterlow Park.'" This was unanimously agreed to.

North Woolwich Gardens.—On the recommendation of the same Committee it was also agreed—

"That it be referred to the Parliamentary Committee to consider and report what arrangements could be made for obtaining Parliamentary powers, either in the present or some future Bill promoted by the Council, for acquiring and maintaining North Woolwich Gardens as a public recreation ground."

The Charges against Messrs. Brass & Sons.—On the motion of Mr. Torrance, it was resolved, after considerable discussion:—

"That, having regard to the grave and serious accusations made at the meeting of the Council on Oct. 22 last,* affecting the position and standing of Messrs. Brass & Sons, and they having urged that they should be heard in defence, it is resolved that the matter be referred to a special committee to investigate and report."

Mr. Torrance said that Messrs. Brass had a complete answer to make to Mr. Burns's charges, and they sought inquiry. He regretted very much to say, however, that the senior partner of the firm had been for the last five weeks ill with typhoid fever, and it was still doubtful whether he would recover. Of course, he knew nothing of the charges yet. Asked to nominate his committee, Mr. Torrance begged to be allowed to postpone that duty to the next meeting, and this was agreed to.

Essex-street, Strand.—On the motion of Mr. Alderman Tayler it was resolved—

"That it be referred to the Improvements Committee to put themselves in communication with the School Board for London, and to ascertain how far it may be desirable to secure some portion of the land lately in the occupation of Messrs. Woodfall & Kinder, on a portion of which the School Board for London are preparing to erect extended offices, for the purpose of widening the river approach to Essex-street, Strand."

After discussing some further business, the Council adjourned.

* See *Builder* for Oct. 26, p. 294, and for Nov. 9, p. 335.

Illustrations.

ST. PAUL'S CHURCH, KENSINGTON.

THE new church of St. Paul, Kensington, takes the place of the iron church erected by the Ven. Archdeacon Sinclair in his vicarage garden about thirty years ago.

The arrangement of the plan provides for the grouping of the larger proportion of the congregation around the pulpit, by which the number of those who are unable to see the preacher is reduced to 6 per cent., the number who are shut off in the ordinary type of nave and aisled church being about 17 per cent.

Special provision is made for ventilation,—fresh air, warmed in winter, being admitted through inlets in the wall, and the foul air drawn through tanks over the ceilings by a gas-fire on the flêche.

The church is built almost entirely of red brick, the only stone used being in the caps and bases of the pillars and the gables of the buttresses.

Accommodation is provided for 1,000 worshippers, at a cost of 10,600*l.*, including heating, lighting, draining, ventilation, fences, chairs, architect's commission, and clerk of works' salary. The superficial area of the church is 10,700 ft., and its cubical contents 431,000 ft.

The design, by Mr. Arthur Baker, F.R.I.B.A., was selected in a limited competition. The contract was executed by Messrs. Howell & Sons. The wrought-ironwork was carried out by Messrs. Newman & Co.; and the pulpit and font were executed by Mr. Bridgeman, of Lichfield. The altar-table, the gift of Mr. J. France, was made by Messrs. Farmer & Brindley; the gas-fittings by Messrs. Potter & Sons; and the vestry stoves by Mr. Shorland.

ATHENS CATHEDRAL.

THIS drawing of the façade of the Byzantine Cathedral at Athens is published in connexion with the first article in this number, on Byzantine architecture in Greece, to which it forms one of the illustrations.

COMPETITION DESIGN FOR NEW SCHOOLS, COVENTRY.

UNDER a scheme for the amalgamation of three of the Boys Charities in Coventry, competitive plans for new school buildings were advertised for which should provide the following accommodation:—Chemical laboratory for fifty, two workshops, eight class-rooms, large hall to seat 400, dining-room to seat 100, boarding-house for forty boarders, rooms for matron and assistants, masters, &c., also a head-master's house.

As the boarders would be required to do house duty, their workshed is provided in close proximity to the kitchens, and the culinary offices, with the matron's room, are detached, though easy of access from the dining-hall. The dining-hall is placed against the assembly hall, so that they may be thrown together if required, and advantage is taken of their position for arranging the dormitory over them in the roof, the floor being at the tie-beam level. The aspects of the different departments are carefully studied.

The design was submitted by Mr. C. E. Bateman, of Birmingham, and Mr. H. R. Appelbee, of London, and was favourably reported upon to the Building Committee by the Assessor. It is to be regretted that the Committee have not adopted Mr. John O. Scott's award, and placed the commission for carrying out the work with Mr. Reginald T. Blomfield, whose design received the first premium.

C. E. B. AND H. R. A.

CROSBY CONGREGATIONAL CHURCH AND SCHOOLS.

THE northern portion of this building, consisting of the meeting-hall and schoolroom, with class-rooms, vestries, infants' schools, kitchen, &c., was erected in 1884, upon a fine site at the corner of Mersey and Eske-roads, at Crosby, near Liverpool.

The meeting-hall is used as a church until the remaining portion of the building is completed, and a large congregation has already been gathered there.

Accommodation will be provided in the church for about 750 on the ground floor and in end gallery.

The great width given to the church by the double-nave arrangement adopted will enable the whole of the congregation to come within a comparatively short radius of the preacher.

The plan shows the general arrangement of church, vestries, school and class rooms, which are carefully adapted to the requirements of the Congregational form of worship and for Sunday-school purposes.

The external walls are of local red stone, and the roofs of slates in coloured bands, except that of tower, which will be of copper or ship's metal. Hot-water pipes are used for heating, and special attention is given to the ventilation of the church and schools.

The architects for the building are Messrs. F. & G. Holme, of Liverpool, whose plans were selected in a limited competition; and the schools were erected by Mr. Thomas Urmson, of Soho-street, Liverpool.

PLANS AND SECTION OF EXETER THEATRE.

THESE illustrations show the manner in which the Exeter Theatre has been rebuilt internally since the terrible calamity of the fire; the old *façade* being retained, but modified.

The system is a working out by the architects,

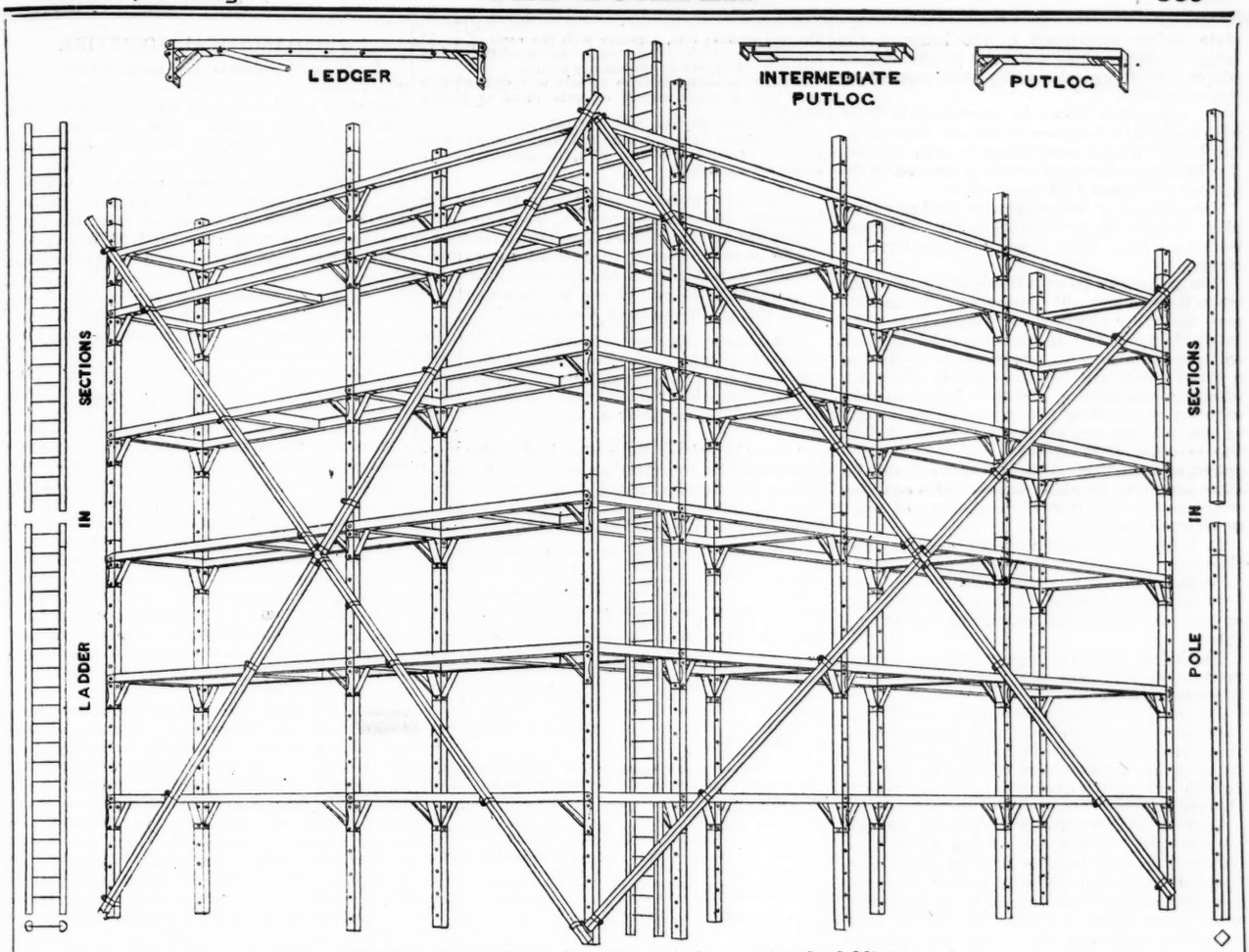


Diagram of Mr. G. Beck's Method of Constructing Scaffolding.

Messrs. Darbyshire & Smith, of the idea for a model theatre propounded by Mr. Henry Irving, and as the only instance so far in which this idea of theatre-planning has been carried out, considerable interest attaches to it.

It is much easier to erect a new building than to alter and adapt the ruins of an old fabric to the requirements of a new order of things, and the architects of the new theatre have had a task before them which has caused an infinite amount of trouble to all concerned, and no little anxiety to all interested. The result of this bold experiment in theatre planning and construction is now apparent, and the public have now an opportunity of expressing an opinion on so important an event in theatrical history.

It will be well to state briefly some of the main principles upon which the "Irving Safety Theatre" is constructed. First: The complete isolation of the edifice from surrounding property is a *sine qua non;* this is achieved at the new theatre. Secondly: The different divisions of the theatre—namely, the stage, auditorium, and artists' section—are separated from each other, and can be isolated at a moment's notice. Thirdly: Every portion of the house is provided with an exit and entrance, which, in case of panic, constitutes two exits communicating direct with the streets, and shut off from any other portion of the theatre. The grand principle of the scheme is the bringing down of the audience (so to speak) to within a few feet of the ground. The highest point which can be reached by the audience at Exeter is only about 8 ft. from the ground. This is arrived at by sinking the pit below ground and increasing the size of the auditorium so as to accommodate the old gallery people on the same level as the pit; this arrangement, it will be seen, necessitates only one grand circle, on which are located both the dress circle and upper circle audience.

It is claimed by the architects that in realising this new order of things at Exeter, there is not a point in the theatre from which the stage cannot be well seen and from which the actors' voices cannot be comfortably and easily heard.

The construction of the theatre is on the noncombustible system which has been adopted in several recent theatres. As in these, the proscenium wall has no opening in it but the stage opening, and this is closed in ten seconds by the fireproof curtain which passes through the stage, and closes on the solid brick wall underneath. Should it be impossible to quench a fire on the stage, all smoke and heat will ascend to the huge funnel in the roof, which is constructed of concrete, with glass louvres and roof; these would be instantly broken with the heat, and the fly-men would escape by their outside staircases; the door to the artistes' department would close out the stage, and the occupants of this part of the theatre have two escape staircases direct into the street. Every staircase is fireproof, with treads 12 in. wide, and risers 6½ in. in height, and all passages or lobbies where the human foot has to be planted when escaping are absolutely unburnable. The pit-floor and the grand circus are of titancrete, and are directly connected with the exit stairs, which are of concrete.

Externally, the original character of the old elevations has been considerably changed, and an escape portico has been added to the angle of the building formed by the junction of Long-brooke-street and New North-road.

The building will seat 900 persons. Saloons and retiring-rooms are attached to the different portions of the auditorium, and the comfort of the public has been everywhere considered.

A NEW METHOD OF CONSTRUCTING SCAFFOLDING.*

THE subject of the paper which I have the honour of placing before you is scaffolding, and although scaffolding is neither food nor physic, yet, as it contributes to the preservation or destruction of life and limb, it has something to do with Sanitary science.

It will hardly be disputed that to no other building appliance is attached such grave responsibilities. Scaffolding should be safe, beyond all doubt, and suitable for the particular purpose to which it is applied; yet, strangely, no appliance, among a large class of builders, receives so little attention, the common method being a rough-and-ready mode of placing together anything to hand, and using it as scaffolding. Accidents frequently arise from such improper constructions, the not unfrequent reports of which in the newspapers impressed me, and induced me to construct a cheap safety scaffolding that would not only be a protection to life and limb, but would also effect a saving in wear, tear, and maintenance. Pursuing this idea to a practical issue has resulted in an invention which, carried through many modifications, and, with the valuable assistance and advice of some of the largest builders and most practical men in this district, I now believe to be in principle practically perfect.

In dealing with this invention I have kept before me:—

First. To make a structure safe, adjustable, portable, and in itself independent. Second. To construct it so as to adapt it to a variety of purposes and uses. Third. That the cost of its production and maintenance should be moderate, and if possible relatively cheaper than good ordinary scaffolding.

For scaffolding I use vertical poles, advantageously of square wood, having holes or slots formed therein at equal distances apart. These holes or slots serve to regulate the height of each tier or platform. Each pole is fitted at one end with a metal socket or shoe, into which another pole is inserted to increase the height of the standards or poles supporting the remainder of the scaffolding. I provide, also, horizontal putlogs (square by preference), fitted at each end with metal brackets, having holes or slots formed therein to correspond with and fit over the pole holes, to which they are secured by screws or bolts. Square section ledgers, fitted at each end with metal brackets, similar to those on the putlogs, with the addition of two or more ears to each, and with a swivel plate at the head of the bracket, to use when required to secure returned scaffolding.

All holes in the structure correspond, so that all pins or bolts used to connect the parts are interchangeable.

To effect a return portion of scaffolding, one hole is made in the centre of each ledger to correspond with and fit the hole in the swivel-

* From a paper by Mr. G. Beck, read at the Congress of the Sanitary Institute held at Worcester, and referred to in the *Builder* for Sept. 28, p. 242.

plate before mentioned at the head of the bracket. Other holes are made in the ledgers adapted to fit swivel angel plates, secured by screws or bolts.

An adjustable ladder in short lengths fitted with sockets to lengthen it out as required by the height of the scaffolding, is also applied. The ladder, or sections thereof, is secured to the putlogs or ledgers with metal clips.

The putlogs or ledgers can be used at convenient heights on any or every tier, to guard workmen from falling off the platform or stages.

The ladder can be used inside the scaffolding when the whole is self contained. The scaffold may be either single or double, and is absolutely rigid. It has also a further adjustment, so that, when extra bearing power is required at a given point, the interchangeable parts will discharge this service, and this, joined with its capacity of standing firmly and independently of the building, renders it specially adapted for the erection of stone-faced buildings, church spires, and the like. It is also very suitable for large interiors, its short length poles enabling workmen to take it easily in and out of small or cramped openings.

It is applicable also for the construction of shedding, shopping platforms, or fixtures, movable buildings, colonial houses, or the like.

It can be stowed away into limited space, or even into itself, thus forming its own storage shed.

No skilled labour is required for its erection or removal; ordinary intelligence can perform the operation.

Its wear, tear, and maintenance would compare very favourably with the present mode. Rope, a costly item, which soon decays, and being of marketable value is liable to be stolen (which applies also to chains), is not used in this scaffold.

Cost of production can at present be only approximately arrived at. From information obtained from a reliable firm in the timber trade, I learn that suitable timber ready for use may be bought as cheap as, or cheaper than, good poles. The ironwork can be made in malleable cast steel (annealed) very cheaply, and, considering the matter all round, including wear and tear, it may be estimated at about two-thirds that of the present scaffolding when properly erected.

THE SCHOOL BOARD FOR LONDON AND ITS BUILDINGS.

AT the meeting of the School Board for London, on the 14th inst., Mr. Lobb put the following question to the Chairman of the Finance Committee (Sir R. Temple):—

"Whether it is a fact that thirteen builders (as per list supplied) have received, for contracts carried out by them, the following amounts respectively:—

£259,350 15 6	£89,483 2 8	£128,186 19 6
116,349 7 1	313,620 1 2	137,831 14 10
120,122 11 6	98,689 10 4	228,105 1 9
72,979 5 8	192,940 15 0	325,795 9 10
69,890 11 8		

Making a total of 2,153,345*l.* 6s. 6d."

Sir R. Temple said, in reply, the figures were quite correct, and he could only answer in the affirmative.

Mr. Lobb asked Mr. Helby:—

"Whether it is not a fact that grave irregularities have taken place, and that inferior materials have been used in the construction of the schools by some of the firms who have received upwards of 2,000,000*l.* sterling in payment of their contracts."

Mr. Helby said: Grave irregularities have taken place, and inferior materials have been used in the construction of some schools, and indications of these things are frequently brought before the Works Committee. As to the second part of the question, I have no specific information.

At the meeting of the Board on the 21st inst., the Works Committee reported as follows:—

"The Committee have had under consideration the following report of the Superior Officer for Repairs, dated November 8, 1889, with reference to the Salter's-hill School, West Norwood (West Lambeth, AW):—

'The Clerk of Works having reported serious cracks and settlements in the lofty gable walls of the new portion of this school, the Architect and myself have made an examination, and deemed it necessary to take prompt measures to ascertain the cause and prevent further mischief. The ground has been opened, and the foundations exposed. Immediately under the concrete foundation a 6-in. drain-pipe is found running along the whole length of the wall; this has given way under the weight of the wall; some of the pipes are broken and the drain is choked; the water has consequently been soaking into the clay upon which the wall stands; this, together with the roots of an old tree which were left in the ground, has caused the wall to give way. I append an explanatory sketch.

It will be necessary to shore up this wall, and underpin same with Portland cement concrete down to a good foundation.

The old drain will have to be diverted.

An estimate cannot be formed with any degree of accuracy of the cost of this work, but approximately I should say about 50*l.*'

Steps are now being taken with the view to rendering the building secure, and the Committee are making further inquiries in reference to the manner in which this school was erected, and also in reference to the responsibility to be attached to the Clerk of the Works who supervised the enlargement of the school."

The Committee also recommend—"That the Committee be authorised to incur the requisite expenditure for carrying out the necessary works to the Salter's-hill School, West Norwood (West Lambeth AW), in order to render the building safe."

"The Committee have also had under consideration the following report of the Superior Officer for Repairs, dated November 5, 1889, with reference to the Woodland-road School, Upper Norwood (West Lambeth AY):—

'As requested. I have this day made a careful examination of these buildings, which were erected about three years since. The following is my report:—

Brickwork.—The whole of the brickwork throughout the school, including the boundary-walls and schoolkeeper's house, is built with mortar of the worst description. It has no binding or adhesive properties and no grit. There is evidence that a large amount of half-burnt clay was used in the place of sand, and there are many hollow joints in the walls. The mortar, on being disturbed, crumbles to a very fine powder, and does not in any way adhere to the bricks. This is a serious matter, as any disturbance of the clay upon which the buildings are erected may produce serious results.

Rain penetrates the walls of the schoolkeeper's house. An unfinished chimney-stack and a coped wall on the school roof must be rebuilt; the mortar has washed out and the bricks are loose.

The boundary-walls and chimney-stacks need repointing to protect them from the weather, and the repointing of the whole of the buildings will soon be necessary.

I have taken samples of the mortar from various parts of the building and have them in my room.

Portland Stone.—Some of the external stone is of the most inferior description, and contains shakes and sand-holes, fractures and broken edges, and is from the outside beds of the quarry. The rule of setting the stones upon their natural beds has not been strictly adhered to. Want of skill is shown in setting out the work, as well as in the workmanship.

The following stones should be taken out at once and replaced with others of the proper description:—

Four sills to large windows.

Four jamb-stones at infants' entrance to building.

Two curb-stones under railing in infants' playground.

All curb-stones under railing along George-street.

The stone jambs of children's entrances in the boundary walls appear to be without dowels. Some of the stones have moved upon their beds, and several inferior stones require renewing.

Most of the stones are of large scantling.

Two new wood sills are necessary to windows overlooking infants' playground. One is broken, the other is warped.

Roofs.—The valley tiles fit badly.

The large zinc flat over the infants' cloakroom has sagged in the centre and around the skylights, and holds pools of water. This will have to be taken up and reconstructed.

Schoolkeeper's House.—Owing to the damp course being below the level of the surrounding tar-paving, damp rises in the walls. There are only two small air-bricks for ventilating the space under boarded floors, and these are half buried in the tar-paving. There is no concrete under the boarded floors to cover the wet clay.

The result of all this is that wet-rot has set in; there are already some holes through the boarded floors. These floors will have to be taken up, 6 in. of concrete laid over the clay, additional air-bricks inserted in the walls, and partly new floors provided.

The setting coat of plaster is falling from the walls throughout the house, partly on account of the damp, but principally on account of the undercoat not being properly "scored" or keyed. The wall-paper is hanging from the walls in several places, and there are numerous cracks in the plaster.'

Into this case also, the Committee are making further inquiries; and as four years have not expired since the completion of this school, they propose to call upon the contractors to make good the defects at their own expense.

They further have to report that the Committee propose to call upon the contractors for the Woodland-road School, Upper Norwood (West Lambeth A.Y.), to make good the defects in the building."

Mr. Helby having moved the adoption of the recommendations,

Mr. Lobb said these reports of the Superior Officer for Repairs were but a sample of what had been going on up to a recent date in connexion with the Works Department.

The recommendations were adopted.

The Right Hon. the Speaker on Saturday last entertained nearly eighty of the *employés* of Mr. John Thompson, of Peterborough, who had been engaged on works at Sandy.

ARCHITECTURAL SOCIETIES.

Leeds and Yorkshire Architectural Society.—The Leeds and Yorkshire Architectural Society held their usual dinner on Monday night at the Queen's Hotel, Leeds. The President (Mr. Henry Perkin) occupied the chair, and there were about seventy gentlemen present, including the following guests:—Mr. W. L. Jackson, M.P., Financial Secretary to the Treasury; Mr. T. C. Hope, President of the Bradford Society of Architects; Mr. J. J. Wilson, President of the Fine Arts Club; Colonel Harding, chairman of the Fine Art Gallery Committee; Mr. B. G. Wilkinson, chairman of the Leeds School Board; Mr. F. Suddards, Art Master, Yorkshire College; Professor Ransome and Professor McGill, Yorkshire College; Mr. E. P. Arnold Foster, Mr. Leonard Cooper, Mr. J. W. Oxley, Mr. Talbot Baines, Mr. W. H. Herbert Martin, F.R.I.B.A., Bradford, and others. Mr. E. F. H. Wigfall, United States Consul, gave the toast of "The Leeds and Yorkshire Architectural Society." The President, having returned thanks, said that on entering upon the second session of his term, he hoped during the period remaining to do his best to increase the membership of the Society, both as regarded practising members and also honorary members. Hitherto they had had from the honorary members ungrudged support, for which they were very grateful; but they looked for a further extension of that membership in order that they might eventually form a Board of architects and laymen powerful enough to bring influence to bear in the direction of the artistic development of the town. Some such power was sadly needed in all their large towns, where handsome buildings were often erected without regard to the advantages to be obtained by suitability of site and effect as regarded surroundings. During the last year they had increased the membership of architects in practice in neighbouring towns, and they hoped for further assistance of this kind. Local societies were being allied to the central body, the Royal Institute of British Architects, in order to bring about those various reforms which the experience of many years had shown to be needful in the profession. And from an improved and well-regulated practice the public would derive benefit. In his opening address last session he pointed out the great need of a diploma to practice. The remarks which he then made on the question were somewhat adversely criticised in the architectural press; but he was afraid his exact intention was not clearly understood. At that time they did not propose to join the Institute, because its programme was not sufficiently advanced. During the year, however, steps had been taken which met their wishes. In the new Charter was incorporated an efficient scheme of registration, and the Council of the Society had now decided to support the Institute. Registration was to be effected by progressive examinations, three in number. Diplomas or certificates would be granted to all passed candidates in the various examinations.

Manchester Society of Architects.—At the annual dinner of this Society, held at the Queen's Hotel, the following guests were present:—The Mayor of Manchester; Mr. A. Waterhouse, R.A., President of the Royal Institute of British Architects; Sir Charles Hallé, Mr. J. H. Woodhouse, President of the Manchester Architectural Association; and Mr. J. H. P. Leresche, J.P., Hon. Legal Adviser to the Society. The members of the Council elected for the year 1890 are:—President, Mr. R. K. Freeman, F.R.I.B.A.; Vice-President, Mr. J. Medland Taylor, with Mr. E. Salomons, F.R.I.B.A., Mr. W. A. Royle, F.R.I.B.A., Mr. T. Worthington, F.R.I.B.A., Mr. Murgatroyd, F.R.I.B.A., and Mr. J. G. Elgood, A.R.I.B.A.; and Mr. John Ely, F.R.I.B.A., and Mr. Paul Ogden, A.R.I.B.A., Hon. Secretaries.

OBITUARY.

Mr. Harry R. Newton, F.R.I.B.A.—The late Mr. Harry Robert Newton, who was elected an Associate in 1853 and a Fellow in 1860, and whose death occurred suddenly in Bedford-street, Strand, on the 14th inst., was the son of Sir William John Newton, the miniature-painter, and the grandson of James Newton, engraver. He is described in the *Times* of the 20th inst. as being also a collateral descendant of Sir Isaac Newton. Mr. H. R. Newton was undoubtedly eccentric, and a short time before his death caused some books and papers of family

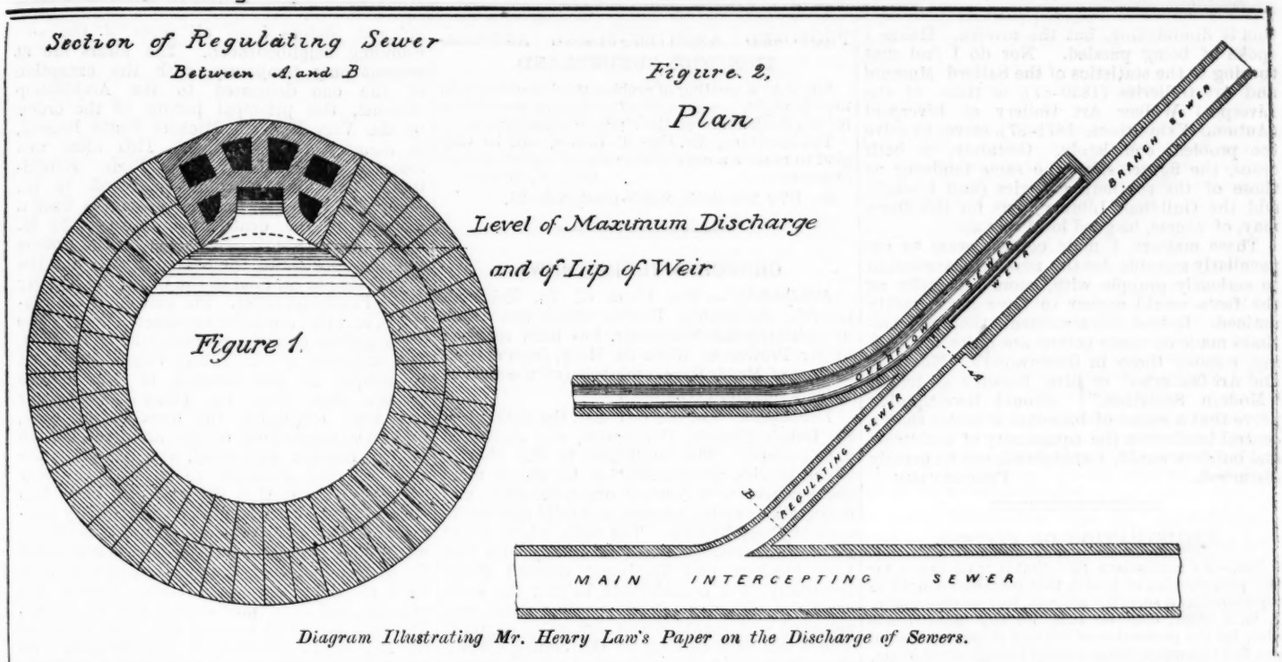


Diagram Illustrating Mr. Henry Law's Paper on the Discharge of Sewers.

nterest to be sold for a few shillings, among them being a large packet of original drawings and memoranda, which had evidently belonged to his granduncle, William Newton, who translated "Vitruvius," and had a great deal to do with the second volume of "Stuart and Revett." Happily, the packet was knocked down to Mr. Andrew Oliver, Associate, who has presented it to the Library, and it will shortly be reported on by the Literature Standing Committee, a few members of which have been appointed to consider the miscellaneous collection of curious relics it contains.—*R.I.B.A. Journal.*

Mr. T. A. Walker.—We regret to have to record the death of Mr. Thomas A. Walker, the contractor for the Manchester Ship Canal. He died on Monday last, at his residence, Mount Ballan, near Chepstow, at the age of 62. A Cardiff paper (the *Western Mail*) gives an interesting biographical sketch of the deceased, who will be remembered for the great dock and railway works which he carried out. Perhaps the most notable of these was the Severn Tunnel, about which he wrote an interesting book. He seems to have been much esteemed by his employés, who numbered, at the time of his death, so it is estimated, no fewer than 22,000.

ON A METHOD OF REGULATING THE MAXIMUM DISCHARGE OF SEWERS.*

In designing a system of drainage it is frequently required to limit the quantity which one or more of the sewers shall be capable of discharging at their outfall.

In the case of the formation of joint boards, for dealing with the sewage of several separate districts, it is usual for the Local Government Board to prescribe 250 gallons per house per diem as the quantity which the joint board shall make provision for receiving into the main intercepting sewer from each branch or district sewer.

Also, in the case of the drainage of only one district, it becomes necessary to limit the quantity which the sewers shall discharge at their outfall or junction with the main sewer, as the case may be; not only because in the treatment of the sewage, whether on land or by chemical process, it would be impossible to deal with the whole of the discharge from the several tributary sewers in times of heavy falls of rain, but further, because the main intercepting sewer would become of inconvenient dimensions if made capable of receiving the aggregate maximum discharge of all the sewers which is intercepted.

It is proposed to fulfil this requirement in the following manner:—

The discharging capacity of a sewer is always proportional to the cube of the transverse sectional area filled by the sewage, divided by the wetted perimeter. This quotient gradually increases as the depth of the stream in the sewer increases, until it reaches a certain height (which, in the case of a circular sewer, is equal to 0·9496, the whole diameter being unity), after which, as the sewer becomes further filled, this quotient diminishes, and the quantity discharged becomes less.

If, however, the form of the sewer above the line of the maximum discharge is modified in such a manner that, as the sewage continues to rise in the sewer, the quotient obtained by dividing the cube of the area filled by the wetted perimeter remains constant, then the quantity discharged by the sewer will also be constant—neither increasing nor decreasing—although the height of the sewage may vary between certain limits.

In the accompanying diagram, fig. 1 exhibits the form to be given to a circular sewer above the line of maximum discharge in order to render the discharge equal in quantity, although the sewage may rise above that level; and the following table gives the width of the sewer at each successive hundredth of the diameter above the line of maximum discharge, the diameter of the sewer being unity, namely:—

Width at the line of maximum discharge		.....	0·4376
,,	1 hundredth of dia. above the same	.....	0·3984
,,	2 hundredths	,, ...	0·3632
,,	3 ,,	,, ...	0·3317
,,	4 ,,	,, ...	0·3037
,,	5 ,,	,, ...	0·2790
,,	6 ,,	,, ...	0·2574
,,	7 ,,	,, ...	0·2388
,,	8 ,,	,, ...	0·2225
,,	9 ,,	,, ...	0·2090
,,	10 ,,	,, ...	0·1979
,,	11 ,,	,, ...	0·1891
,,	12 ,,	,, ...	0·1824
,,	13 ,,	,, ...	0·1777
,,	14 ,,	,, ...	0·1748
,,	15 ,,	,, ...	0·1735
,,	16 ,,	,, ...	0·1724
,,	17 ,,	,, ...	0·1714
,,	18 ,,	,, ...	0·1706
,,	19 ,,	,, ...	0·1699
,,	20 ,,	,, ...	0·1693

Having determined the maximum quantity which it is required for the sewer to discharge at its outfall, such dimensions must be adopted for the sewer, for a certain length from such outfall, as shall enable it to discharge that quantity when the sewer is filled to the line of maximum discharge, and above that level the sides of the sewer must be made of the form shown in the diagram.

At the upper end of this length of sewer, an opening is made in the side of the sewer forming an overflow weir, the level of the lip of which is the same as that of the line of maximum discharge, that is to say, the same as the lower limit of the height of the stream having the constant rate of discharge; and this sewer is made of such a length that, when the stream rises to the upper limit of such constant rate of discharge, the quantity which will flow away over the weir shall be equal to the maximum quantity which the upper portion of the sewer can bring down, after deducting from the same the constant quantity which can be conveyed away by the lower length of the sewer with the modified form of section. The discharge from the weir is conveyed away by an independent channel provided for that purpose.

Fig. 2 illustrates the practical application of the method. If, for example, the diameter of the lower or regulating length of the sewer is 2 ft., with a fall of 1 in 500, its maximum discharging capacity would be 590 cubic feet per minute; and if the diameter of the upper portion of the sewer above the weir is 3 ft., with the same fall, its maximum discharging capacity would be 1,643 cubic feet per minute; consequently, 1,053 cubic feet per minute would require to be discharged over the weir; and if the length of the weir is 22 ft., this quantity would be discharged with a depth of 4·42 inches flowing over the lip of the weir. Therefore, with the maximum quantity which the upper sewer could bring down, the sewage could never rise in the regulating sewer above the upper limit of constant discharge.

If the upper or regulating portion of the sewer were made in stoneware, moulded to the required form, as shown in the diagrams, no special skill or care would be required in the construction of the sewer.

* A paper by Mr. Henry Law, M.Inst.C.E., F.R.M.S., read at the recent Congress of the Sanitary Institute held at Worcester.

MUSEUMS AND GALLERIES IN CONNEXION WITH POPULATION.

Sir,—Perhaps you would allow me to supplement my letter in your issue of October 19 by pointing out that the Gallery at Trafalgar-square is not the only one where the statistical movement is retrograde.

In the *St. James's Gazette* of March 6 and November 7, 1888, it was noticed that a similar state of things has been for some years manifesting itself at the South Kensington and Bethnal-green Museums. If the yearly visitors of these three be added together and then dealt with as were those of the National Gallery we have a very suggestive table. (It will, of course, be remembered by your readers that before 1888 there were no turnstiles at the National Gallery.)

Visitors to the National Gallery, together with those to South Kensington and Bethnal-green:—

Years.	Visitors.	Years.	Visitors.
1877	100	1883	82·0
1878	78·4	1884	72 0
1879	75·2	1885	74 8
1880	83·7	1886	72·4
1881	83·2	1887	68·1
1882	78 9	1888	80 9

So large was the increased attendance caused at Bethnal-green Museum by the exhibition there of the Queen's Jubilee presents that it raised the gross total. But this very fact is hardly encouraging if the special point of *permanent attractiveness* be considered.

Now, South Kensington and Bethnal-green are not, of course, localities where the popula-

tion is diminishing, but the reverse. Hence I spoke of being puzzled. Nor do I feel that turning to the statistics of the Salford Museum and Art Galleries (1850–87), or those of the Liverpool Walker Art Gallery at Liverpool (Autumn Exhibitions, 1871–87), serves to solve the problem completely. Certainly, in both cases, the figures show the same tendency as those of the southern galleries (and I might add the Guildhall Library), but for this there may, of course, be good local reasons.

These matters, I must confess, seem to me peculiarly suitable for the new Art Association to seriously grapple with, more especially as the facts would appear to have been hardly noticed. Indeed, the statements that are sometimes made on these points are quite misleading, notably those in Greenwood's "Museums and Art Galleries" or Mrs. Besant's sketch of "Modern Socialism." Should investigation prove that a series of branches is better than a central institution the equanimity of architects and builders would, I apprehend, not be greatly disturbed. PERCENTAGE.

REGISTRATION OF FITTERS.

SIR,—As sanitarians find that it is necessary for the preservation of health that plumbers should be registered as a security against bad workmanship, I, as a fitter, consider that, for the same reason also, for the protection of life and property, that all gas and hot-water fitters should be registered or *not*, according to ability.

The danger arising from incompetent fitters' work is constantly brought before us in the newspaper accounts of explosions, not to speak of the many persons partially poisoned by slight leaks of gas all over the house,—an inconvenience which has to be paid for in more ways than one.

This subject is well worth consideration. Gas has a long life before it, notwithstanding the electric light, and hot-water and boiler-fitting is illimitable. As one who was bound apprentice and really learnt my trade, I should be very glad to see something done. J. R.

VENTILATION OF STREET SEWERS.

SIR,—There are various ways of ventilating the street sewers being promulgated just now, and which involve *continuous attention and expense*, that I beg to condemn, and especially if those styles are intended for general use. One style recommended is the burning of gas in specially-constructed street lamps, so that the lamp might act as an outlet ventilator or air-pipe for the sewer, the sewage-gas or air from the sewer having to pass through or near the gas-flame so as to be burnt. Now, to be of any real value this would need a very large amount of gas to be continuously used, and I do not think this expense is necessary. I remember seeing a street lamp used in the way spoken of near a range of buildings where complaints of bad air from the sewer occurred; but an old horse-shoe hung on the lamp would, in my opinion, have done as much good. What I understand was really needed in this case was the leaking drains, &c., repaired, and disconnecting traps put on between the houses and the sewer.

When the fire of an asphalte boiler is lighted on the street, the smoke from it at this low level is a nuisance. We put up with it because it is only temporary; but, were in continuous, the chimney would have to be raised above the neighbouring houses. So with the ventilating outlets of street sewers. Let them be raised up by means of proper pipes to above the roofs of the houses, with fixed exhaust ventilators on them, and then the sewer gases would get exit continuously, and cause no annoyance, while they would be freely disinfected by the sulphur in the smoke from the chimneys, and be also blown away high up in the air.

Generally speaking, it is all nonsense to speak of the sewer air being "forced" into our houses. It is generally sucked in, especially if the house is inhabited and the drains bad, and not properly trapped. I am not aware of the air in the sewers having sufficient pressure to force properly set traps. No such pressure can occur, if the sewers are at all ventilated, to speak of. In the case of a tidal sewer, special attention may have to be given to the ventilation.

Another cure for sewer gases is to be putting chemicals continually into the sewers, but this also means never-ending expense and attention, and the recommendation is made in entire oblivion of the fact that upon proper application to the atmosphere, the wind, and it will give a continuous supply of oxygen for nothing. Properly constructed and ventilated sewers do not need chemical disinfectants continually any more than healthy men need medicines daily. Gully gratings at the edge of pavements should be trapped, and where the sewer gratings in the middle of the streets do not give satisfaction, then use the high-level pipes coated inside so as not to rust up. W. P. BUCHAN.

Glasgow.

PROPOSED ARCHITECTURAL ASSOCIATION FOR SUNDERLAND.

SIR,—At a meeting of architectural students held here to-night, it was resolved to form an association for the furtherance of the study of architecture.

The secretary, Mr. Geo. T. Brown, will be very glad to receive a copy of the rules of any other such association. GEO. T. BROWN.

35, *West Sunniside, Sunderland*, Nov. 27.

CHURCH BUILDING NEWS.

Bridgerule. — The tower of St. Bridget's Church, Bridgerule, Devon, which was struck by lightning last November, has been restored by Mr. Prower, of Week St. Mary, from specifications of Mr. J. Hine, architect (of the firm of Hine & Odgers, Plymouth).

Darlington.—On the 6th inst. the chancel of St. Luke's Church, Darlington, was dedicated and opened. The additions to the church, which provide accommodation for ninety more seats, consist of a chancel, organ-chamber, and commodious vestry, erected in a solid and severe type of Early English. The walls, which are of great thickness, are faced externally with Tow Law blockers and Dunhouse dressed stone. Internally, to a considerable height, the walls are lined with a moulded panelled dado, surmounted with moulded and embattled capping. Above this dado and up to the ceiling cornice the walls are plastered, finished "rough"—the plastering being broken at intervals by internal stone dressings of windows and arches. The ceiling is a lofty one, of woodwork, seven sided and formed into panels by moulded longitudinal and transverse ribs, the whole springing from a handsome, well moulded, carved, and embattled cornice. The chancel is lighted by two north windows of two lights and a large five-light east window, formed both on inside and outside in dressed stonework, and cased with rolled cathedral glass. The chancel seating and reading-desks (both of which are moulded and carved), and all internal woodwork, is of pitch-pine and "dull" polished. The floors are paved with encaustic tiles and Yorkshire stone on concrete foundations. Artificial lighting is by brass pendants, made by Messrs. W. Russell & Son. Inlet and outlet ventilators are provided. The stonework has been carefully done by Mr. S. Allanson, Darlington, and the woodwork by Mr. W. W. Franks, the other contractors being Messrs. Wharton & Son for slating, Messrs. W. Russell & Son for plumbing, and Mr. T. Metcalfe for painter's work. The additions have been made from the designs of, and have been carried out under the personal supervision of, Messrs. Clark & Moscrop, architects, Darlington.

ROMAN CATHOLIC CHURCH-BUILDING NEWS.

Highgate.—The new Church of the Passionists, Highgate-hill, was dedicated on the 21st inst. The church replaces one which was built some twenty-five or thirty years ago. The foundation-stone of the new building was laid on May 24, 1888, by Bishop Hedley, of the Catholic Diocese of Newport and Menevia. To speak of the structure itself, it may be stated that the church is dedicated to St. Joseph, and is the only memorial church of the Sacerdotal Jubilee of Leo. XIII., erected in England by his special permission. According to the *Daily Chronicle*, the design is Romanesque, freely treated to harmonise with the old "Retreat," so far as the exterior is concerned. The interior, including ceiling and dome, which latter surmounts the whole sanctuary, and the panels to the walls, have been elaborately finished with colour decorations and paintings, executed by Mr. N. H. J. Westlake. The new church provides seating accommodation for about 1,000 persons in the nave and Lady-chapel, the latter seating about 100 people. On each side of the nave there is a processional aisle, about 6 ft. wide, the Lady-chapel being divided from the north aisle by an arcade of six bays, equal to three of the bays of the nave. The total internal length of the church is 146 ft., and the width, including aisles, about 55 ft. The panelled ceiling, which is of elaborate design, is 53 ft. high, from the floor to the internal apex. The tower over the baptistery is carried to a height of 100 ft., and the dome, 140 ft. high, is constructed of steel. The tower, dome, and cupola are covered with copper, and form a conspicuous feature from all parts of the surrounding neighbourhood. The altars are at present only temporary, with the exception of the one dedicated to the Archbishop Michael, the principal patron of the order, by the Very Rev. F. Michael Watts Russell, in memory of his father. This altar was recently exhibited in the Paris Exhibition. The high altar is dedicated to St. Joseph, and over it, for the present, is fixed a painting of the death of St. Joseph, by M. Laby. There are six other chapels; the Epistle side is dedicated to the Sacred Heart, and the Gospel side to St. Paul of the Cross, the founder of the Passionist order. Six exit doors are provided, and the sacristies are commodious. The organ-gallery over the porches is 38 ft. by 16 ft. The architect is Mr. Albert Vicars, but what is unique in the erection of this edifice is the fact that no general contractor has been employed, the work having been, under the supervision of the architect, carried out by Brother Alphonsus, who has given the most devoted attention to it, with the very successful result that the cost has been less than 17,000*l.*, whereas under the ordinary contract arrangements the expenditure, it is stated, would have been over 20,000*l.* This is accounted for by the fact that the lay brothers worked hard at their respective trades during the erection, and thus saved a great deal of money. The very beautiful carving has been executed by Mr. R. L. Boulton, of Cheltenham. So much for a brief description of the building. The wood block flooring has been executed by the Acme Wood Flooring Company, Limited.

Wareham.—The new R.C. Church of St. Michael, Wareham, Dorset, will be opened on the 19th inst. Mr. Albert Vicars is the architect.

The Student's Column.

WATER-SUPPLY.—XXII.

TOWN SUPPLY.

THE sources of the supplies to Liverpool, Manchester, and Glasgow have incidentally been alluded to in the course of our observations on quality, gathering-grounds, &c.; and the history of the alimentation to these cities is well-known to any one familiar with the ordinary literature of the day. Therefore, we need only remind the student of a few leading particulars concerning this portion of the subject. The supply of Liverpool from the old gathering-ground of Rimington having in dry seasons proved inadequate, both for the increasing wants of the inhabitants and the requisite amount of compensation water, engineers found another though distant source of supply in capturing the upper waters of the Vyrnwy in North Wales, by erecting an embankment, and creating a vast artificial lake or reservoir behind it, from which, on completion of the works, the city will be served. Manchester, from almost the same causes, obtained another source of supply from Lake Thirlmere, particulars of which will be found in the late Mr. Bateman's work on the "Manchester Waterworks." Glasgow has for many years been supplied from Loch Katrine, and, although at first it was feared that the softness of the water would be slightly detrimental to health, because of its known readiness to attack lead, thus producing lead-poisoning, &c., experience has shown that these apprehensions were practically groundless. The quality of the water supplied to this city is not inferior to that of any other city in the United Kingdom.

Let us now consider the water-supply of Edinburgh. The first scheme of any note embodying the alimentation of this city was brought forward in 1621, when an Act was passed by the Scottish Parliament, for the introduction of water from Comiston springs, which rise about three miles to the south of the capital; but sixty years were allowed to elapse before this source was actually utilised. Prior to this, the inhabitants were almost entirely dependent on wells for their wants. The Comiston springs yielded something like 135,000 gallons per day, and, this being found insufficient, other springs near the same source were brought into requisition. These additions were finished in 1720, and nothing more was done until 1755, when, after the inhabitants had suffered considerably from scarcity of water, the scheme was further extended to include other springs and streams on the north side of the Pentland Hills

and from Bonaly, six miles south-west of Edinburgh. In 1811, Telford reported that a better supply could be obtained from certain springs on the Eastern portion of the Pentlands, and after the necessary preliminaries, the report of that eminent engineer was acted upon, and in 1822 water, amounting to about 2,700,000 gallons per day, was introduced into the city from the Crawley spring and part of the Logan burn in Glencorse valley. The water running into Glencorse, being largely drained from high hills covered with short grass, is naturally free from peat. The ground in the upper reaches, however, is mossy, and the water impounded at Loganlea is sometimes affected. The subsequent additions to the general supply were for many years derived solely from various parts of the Pentland Hills, and it may be useful to briefly explain the broad hydrogeological features of that region.

These hills lie to the south-west of the city, having a general trend in the same direction, and are about sixteen miles in length and five miles in width, their highest summits varying from 1,000 ft. to 1,900 ft. above the sea-level. The ground out of which they spring is itself considerably elevated, and has a useful slope towards the north-east. The configuration of the northern slopes of the hills does not permit of a gathering-ground scheme being conveniently adopted for the city, and if this were not so, the greater quantity of water derived would be so highly impregnated with peaty matter that it could not be used. Nearly all the water of the great extension works (presently to be described) on the Pentlands is obtained from springs, a circumstance of great importance, inasmuch as large storage reservoirs are thereby rendered unnecessary.

Geologically, highly-inclined Silurian rocks are found at the base, and these are covered by coarse conglomerates, grits and sandstone, and by felstones and volcanic ash of Old Red Sandstone age. According to the opinion of the officers of the Geological Survey, these old rocks form a rough anticlinal* axis, with carboniferous strata folded over it. As a result of this disturbance, the whole is very much fractured and dislocated, a large number of important parallel faults being produced; and Mr. Alexander Leslie, M.Inst.C.E, in his excellent paper on the "Edinburgh Waterworks," shows† that "it is to the existence of these faults that most of the copious yield of spring-water, which forms the bulk of the supply from this source, is due." An enormous fault, running along the south-east flank of the Pentlands, which brings the carboniferous against the felstone, produces large numbers of springs throughout its length. The same authority says that "some of them,—namely, the Crawley springs, form part of the supply of Edinburgh, whilst many others are utilised for the supply of neighbouring towns and villages, or are appropriated for the use of the paper manufactories on the North Esk river, into which they naturally drain. . . . . The springs, with the exception of those rising on the north side of the Blackhill, are remarkably steady."

The previously existing works having proved inadequate, in 1843 an Act was obtained for augmenting the supply from the Bavelaw, Listonshiels, and Black springs, on the northern slopes of the Pentlands. These were completed in 1848, and yielded about 2,000,000 gallons per day. In 1847 powers were also obtained to construct four other reservoirs and to enlarge the old one in Glencorse, but, as the demand increased, all these were found insufficient. In 1859 the Colzium springs, and in 1868 those of Crosswood, were introduced. We have now briefly sketched the water-supply of Edinburgh as derived from the Pentland Hills, and have seen that the sources whence it was obtained were gradually pushed farther and farther away from the city upon the increasing requirements of the population. The works in 1868 were capable of producing 8,000,000 gallons per day, or about 34 gallons per head per day.

In spite of all these additions, however, it became clear that something else must be done. Accordingly, in 1874, Parliamentary sanction was given to take a supply (supplementary to that of the Pentlands), from the Moorfoot Hills, situated a little to the east of south, and about twelve miles from the city. This is, essentially, a drainage-area scheme, as very few springs rise in the district, and in this respect it entirely differs from the older method. It consists in draining about 14,500 acres of high ground, and constructing large storage reservoirs to hold the water. The capacity of one of these reservoirs, known as the "Gladhouse," is about 1,700,000,000 gallons, whilst that at Portmore Loch holds about 250,000,000 gallons. When the scheme was brought out, a higher rainfall was relied upon than, as experience proved, was actually available; and we may remark, *en passant*, that this is generally the case in regard to projects of a similar nature. Fortunately, in this instance, however, the diminished quantity of water found to be available did not materially affect the plans, and, indeed, the cheapness of the Portmore reservoir, constructed as it was on the site of an existing loch, enabled the engineers, amongst other things, to find an adequate supply. The total amount derived from the Moorfoot Hills at the conclusion of these important works was estimated at about 8,690,000 gallons per day, so we see that the water-supply of Edinburgh is obtained in almost equal proportions from the two high ranges of hills a few miles to the south of it, and there is much room for extension from either source

Turning now to a supply of a totally different nature, and suitable for a large town, we may instance that of Southampton. This work, having only recently been completed, affords an excellent example of what can be done under very trying geological conditions, to successfully obtain something like 3,000,000 gallons per day from the chalk. In 1838 a very deep well was commenced on Southampton Common, and by February, 1851, it was sunk and bored to a depth of 1,317 ft. when the work was stopped in consequence of the yield only being 130,000 gallons per day, and of difficulties in boring. In 1882 it was resumed, but by reason of the obstruction caused by a broken tool left in it on the cessation of the last attempt, the continuation of the work was found impracticable. We believe, however (but we speak reservedly), that the little water available is now pumped and used for watering roads, &c.

In spite of this failure, which cost about 20,000*l*, the authorities, guided by good geological opinion, were not deterred from still seeking an underground supply from the chalk. It was demonstrated* that there was a remarkable convergence of the underground water-level towards a certain spot not far from Southampton, and this site was selected on which to commence operations. After trial-borings had further confirmed the hydrogeological report, two wells, each 6 ft. in diameter and only 11 ft. 6 in. apart, from centre to centre, were made to a depth of about 100 ft., and to strengthen the walls between, they were lined with iron cylinders. These are believed to be the largest bored wells yet sunk at one operation in this country. The chalk water being rather hard is, in this case, subjected to a softening process. We quote the Southampton works as a clear instance of the invaluable assistance which can be rendered by a careful hydrogeological survey in regard to well-sinking for town supplies. The failure of the first well shows the necessity of carefully considering the geological aspect of the subject.

* The term *anticline* indicates that the strata are disposed in an arch-shaped manner.

† "Min. Proc. Inst. C.E.," Vol. lxxiv. (1883), p. 92.

* "Report on the Water-supply of Southampton." By W. Whitaker, F.R.S.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

18,294, Smoke Extractors, Exhausters, Ventilators, &c. E. S. Strange and J. C. Austen.

The extractor or ventilator which is the subject of this patent is constructed with a central tube surrounded by a partially-perforated outer case, to which it is secured by transverse open frames or ribs. The outer case extends above and below the central tube, and, if desired, is provided with an overhanging open roof, supported by two or more arms attached to the side of the outer case to prevent rain or wind passing the chimney. Above the top of the central tube the outer case is constructed with an inwardly-projecting shoulder; the wind or air, passing through the perforations in the outer case and rising therein, is deflected by this shoulder so as to pass across and above the outer edge of the central tube, and cause a suction of the smoke or vitiated air therein.

18,866, Lavatory and Wash Basins. T. W. Twyford.

The waste-pipe or pillar of these appliances is placed within a niche or recess formed within the inside back of the basin. A plug-valve strainer grating and feet or inclines are also fitted, and the action of these combined effect the improvement claimed.

3,178, Apparatus for flushing w.c.'s. J. Sharples.

This invention proposes to provide a simple means by which the pans or vessels of water-closets may be flushed. It has also in view the disposal and further use of waste water which has already been employed for domestic purposes. The cavity of the pan is made to serve as a temporary cistern, into which waste water or other liquid may from time to time be run; it has a trapped overflow outlet to prevent the rise of fluid to an objectionable height. The main outlet is situated at the bottom of the vessel,—preferably to one side,—or it may be quite outside, and has sufficient area to permit a rapid discharge of the vessel's contents. It (the main outlet) is furnished with a valve operated either at will by means of a handle and suitable attachments, or automatically by connexions with a hinged seat.

9,898, Dampers or Draught Regulators. J. Keith.

The damper as fitted serves as an air-regulator and as a cleaning door for the removal of soot or for giving access to the flue.

14,421, Ornamental Tiles, &c. John Frazer.

This invention has reference to an improved substitute for ornamental tiles for hearths, window-boxes, flower-stands, &c., and is cheaper and unbreakable. Sheet-iron, steel, &c., is decorated and used in the place of tiles. They are fixed by screws or by beads at the edges.

14,648, Bakers' Ovens. G. E. Bailey.

The oven which is the subject of this patent is a kind of double chamber, one being the oven itself and the other an air-chamber heated by a furnace underneath. Escape flues are provided, and the arrangement is that the roof of the air-chamber is really the floor of the oven.

NEW APPLICATIONS FOR PATENTS.

Nov. 11.—17,918, P. Knight and G. Hoyes, Door-knob.—17,928, W. Scott-Moncrieff, Valve Water-closets.—17,953, F. Hilton, Weather-boards for Doors.—17,961, J. Fell, Coating or Covering for exposed Wooden Structures or Timbers.

Nov. 12.—17,985, J. Stone, Tip Wagons and Carts.—18,041, A. Hughes, Protractor.—18,042, J. Martin, Pigments or Paints.—18,069, B. Stocks and W. Illingworth, Automatic Bolt for Doors, Windows, &c.—18,076, H. Lake, Whitelead.

Nov. 13.—18,086, J. Empson and Others, Syphon Flushing Cistern.—18,098, C. Hickton and J. Cleveley, Catch for Doors.—18,125, W. Newman, Sash or Window Fasteners.—18,126, H. King, Flush and Knob Bolts for Doors, &c.—18,132, E. and E. Evans, Sash-fasteners.—18,143, H. Nettlefold and J. Sheldon, Screws.—18,154, W. Luther, Sheet Metal Astragals and Sash-bars.

Nov. 14.—18,174, G. Diggens, Fastenings for Windows, Casements, Doors, &c.

Nov. 15.—18,241, C. Callow and H. Eck, Removing Floor and other Fixed Boards.—18,242, J. Downes, Enamelled Metal Tile Hearth and Enamelled Metal Tiles for Walls and Ceilings.—18,251, W. Phillips, Rendering Windows, &c., Draught and Weather Proof.

Nov. 16.—18,339, J. Gingell and E. Stafford, Chimney-pots.

PROVISIONAL SPECIFICATIONS ACCEPTED.

13,581, J. Rodda, Leakage-detector for Water-pipes, &c.—14,018, R. Brown, Portable Rain-water Pipes.—15,111, W. Hassall, Joining Stoneware Pipes, &c.—15,858, F. Robinson, Flushing Cisterns and Water-waste Preventer.—16,579, W. Bradford, Flooring Material.—16,706, P. Bronner, Whitelead.—16,888, T. Sixsmith, Plank-supporting Frames for Builders, Painters, &c.—16,911, S. and S. Hill, Draught, &c., Excluders for Doors, Windows, &c.—17,280, L. Blumer and J. Tait, Lime-kilns.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

18,457, E. & J. Brook, Regenerative Kilns.—638, G. Jennings, Valves for Water-closets, &c.—977, J. Harper, Portable Scaffold.—1,240, E. Cory and Others, Mortising Machines.—3,310, J. Young, Window Frames and Sashes.—13,807, W. Cussans, Fasteners, &c., for Windows, &c.—14,476, A. Robertson, Draught-excluder for Doors.—14,493, B. Meriam, Drain-tester.—14,899, A. Morrison and M. Ingram, Water-closet Apparatus.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

Nov. 18.—By Walton & Lee.

St. James's—37 and 38, St. James's-pl., and 9 and 10, Little James's-st., u.t. 18 yrs., g.r. £109. 3s. 1d., r. £805 ..... £6,700

By J. & R. Kemp & Co.

Edgware-rd.—No. 131, u.t. 31 yrs., g.r. £12. 12s., r. £92 980

Nov. 19.—By B. Brown.

Poplar—29, 31, and 33, Brunswick-rd., f., r. £93. 12s. £1,010
Stepney—78 and 80, Duckett-st., f., r. £39 p.a. ... 340

By Alexander, Daniel, Selfe, & Co.

Wandsworth-rd.—No. 260, u.t. 46 yrs., g.r. £5 385

By Marler & Bennett.

Bow—F.g.r. of £24, with reversion in 78 yrs..... 560
F.g.r. of £11, with reversion in 78 yrs..... 260
The Imperial Mineral Water Company in St. Stephen's-row, f., r. £100 2,000

By J. & W. Johnson.

City-rd.—22 and 24, Shepherdess-walk, and 4 and 5, Underwood-row, u.t. 10 yrs., g.r. £28, r. £190. 460

By Debenham, Tewson, & Co.

Kensal Green—F.g.r. of £47, with reversion in 95 yrs..... 1,130
Shepherd's Bush—F.g.r. of £16, with reversion in 82 yrs..... 390
Brixton—F.g.r. of £28. 15s., with reversion in 83 yrs..... 710
Hastings—F.g.r. of £10. 10s., with reversion in 61 yrs..... 310
Enfield Highway—F. and c. g.r. of £70, with reversion in 33 yrs. 1,820
Southgate—F.g.r. of £11, with reversion in 35 yrs. 320
Stoke Newington—I.g.r. of £72, u.t. 72 yrs., g.r. £2 1,420
Holloway—I.g.r. of £139. 16s., u.t. 87 yrs., g.r. £1. 3s. 2,810
I.g.r. of £115. 10s., u.t. 78 yrs., g.r. £1. 6s. 2,360
Whitechapel—1 and 3, Alie-pl., u.t. 18 yrs., g.r. £55, r. £123 440
Marylebone—5, Charlton-st., u.t. 12 yrs., g.r. £14, r. £80 400
Bloomsbury—63 to 69 (odd), Endell-st., u.t. 27 yrs., g.r. £100 1,250
Bethnal-green—89, 91, and 93, Seabright-st., u.t. 28 yrs., g.r. £7. 10s. 460
Commercial-rd. E.—112 to 118 (even), Cornwall-rd., u.t. 39½ yrs. g.r. £24 280
Bow—33 to 43 (odd), High-st., and 7 to 13, Sowden-pl., u.t. 15 yrs., g.r. £25 500
Commercial-rd., E.—Eighteen houses in Cannon-st.-rd., u.t. 4½ yrs., g.r. £450 140
Old Kent-rd.—92 to 100 (even), Kinglake-st., u.t. 16 yrs., g.r. £6. 12s. 300

By Wilkinson, Son, & Welch (at Brighton).

Brighton—10, Sussex-sq., F. 2,000
20, Arundel-st., f., in carcase 185
9, Chesham-rd., f., r. £110 p.a. 1,700
8, Chichester-pl., f., r. £45 700

Nov. 20.—By Inman, Sharp, Harrington, & Roberts.

Kensington—10, Kensington-cr., u.t. 32 yrs, g.r. £10 500

By Rogers, Chapman, & Thomas.

Pimlico—10, Westmoreland-pl., u.t., 44 yrs., g.r. £9 470
Paddington—I.g.r. of £27, u.t. 63 yrs., g.r. £2 p.a 510
I.g.r. of £20, u.t. 60 yrs., g.r. £2. 370
Bayswater—I.g.r. of £274, u.t. 61 yrs., g.r. £65 ... 4,370
I.g.r. of £122, u.t. 61 yrs., g.r. £22 2,130

Nov. 21.—By Mullett, Booker, & Co.

Hyde Park—26, Gloucester-ter., u.t. 50 yrs., g.r. £30, r. £140 1,450
80, Gloucester-ter., u.t. 53 yrs., g.r. £6. 6s., r. £200 2,950
I.g.r. of £54. 12s., u.t. 49 yrs., g.r. £22 585

By Bliss & Sons.

Bethnal Green—7 to 15 (odd), Church-row, f. and l. 700

By E. Owers.

Kilburn—27, St. Julian's-rd., u.t. 89 yrs., g.r. £10 370

By Newbon & Harding.

Barnsbury—29, Belitha-villas, u.t. 25 yrs., g.r. £10 340
27, Barnsbury-st., u.t. 34 yrs., g.r. £10, r. £50 ... 400
Holloway—1, Stanley-ter., u.t. 69 yrs., g.r. £6. 6s. 260
Stoke Newington—60, Oldfield-rd., u.t. 74 yrs., g.r. £5 230
Balls Pond—F.g.r. of £16. 1s., with reversion in 14 yrs. 945
Camberwell—69, Camberwell-grove, u.t. 8 yrs., g.r. £12. 10s., r. £60 100
67, Camberwell-grove, u.t. 9 yrs., g.r. £11 50

Nov. 22.—By Dollman & Pearce.

Haverstock-hill—113, Queen's-crescent, u.t. 62 yrs., g.r. £7 430

By G. A. Wilkinson.

Hornsey, Rose-hill—Three houses, with stable, c., r. £69 19s. 750
Muswell-hill—Six f. and c. cottages, r. £74. 15s. p.a. 710
Penge—A plot of f. land, 1a. 1r. 2,550

By W. & F. Houghton.

Walthamstow, Hatherley-rd.—"Oak Villa," f. ... 530
"The Chestnuts" and "Eversleigh," f., r. £52... 790

By C. & H. White.

Bermondsey—94, 96, and 98, Tanner-st., f., area 16,000 ft. 3,000
Brixton—35, Loughborough-rd., u.t. 41 yrs., g.r. £4. 10s. 480
Waterloo-rd.—Nos. 168 and 170, u.t. 8 yrs., g.r. £15 260

By Henry & Latchford.

Clapham—61, Old Town, f., r. £50 p.a. 785

[*Contractions used in this list.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

MEETINGS.

Saturday, November 30.

University College, London (Archæology).—Demonstration at the South Kensington Museum. 7 p.m.

Monday, December 2.

Royal Institute of British Architects.—Mr. R. Elsey Smith on "A Tour in Greece and Cyprus in 1888 as Greek Travelling Student." 8 p.m.
Society of Engineers.—Mr. P. F. Nursey on "Fox's System of Solid Pressed Steel Wagon Frames." 7.30 p.m.
Royal Institution.—General Monthly Meeting. 5 p.m.
Clerks of Works' Association (Carpenters' Hall).—Paper by Mr. F. M. H. Jones. 8 p.m.
Liverpool Architectural Society.—Mr. Damer Harrisson, F.R.C.S.E., on "The Medical Aspects of Ventilation." 7 p.m.

Tuesday, December 3.

Institution of Civil Engineers.—Further discussion on Mr J. I. Thornycroft's paper on "Water-tube Steam Boilers for Marine Engines." 8 p.m.
Society of Biblical Archæology.—8 p.m.
Glasgow Architectural Association.—Mr. W. Connor on "Elgin Cathedral."

Wednesday, December 4.

British Archæological Association.—Mr. J. M. Wood on "The Round Tower Churches of Essex." 8 p.m.
University College, London (Archæology).—Mr. H. Wallis on "Oriental Ceramic Art under the Mahammadan Dominion from the Seventh to the Fifteenth Century." 5 p.m.
Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.

Thursday, December 5.

Royal Archæological Institute.—(1) Mr. F. C. J. Spurrell on "A Sickle and Other Stone Implements lately brought by Mr. Flinders Petrie from Egypt." (2) Mr. J. E. Bale on "A Norman Font in Toftrees Church, Norfolk." 4 p.m.

Friday, December 6.

Institution of Civil Engineers.—Students' Visit to the Electric Light Installation of the Great Western Railway, at Paddington (assemble at the Electrician's Office), and to the Locomotive Running-sheds, at Westbourne Park. 7 p.m.
Bradford Historical and Antiquarian Society.—Mr. T. T. Empsall on "Bradford in the latter half of the Seventeenth Century." 8 p.m.

Saturday, December 7.

Association of Public Sanitary Inspectors.—Mr. E. C. Robins, F.S.A., on "Reasons for the Adoption of a Uniform Title of 'Sanitary Inspector,' and Suitable Test Examinations." 6 p.m.

The Ventilation of Schools.—On Saturday last Professor Carnelley (Professor of Chemistry, Aberdeen University) delivered an address under the auspices of the Aberdeen branch of the Educational Institute on "The Sanitary Condition of Our Schools." Professor Pirie presided, and there was a large attendance. Professor Carnelley spoke more particularly of the air of schools. After showing how important good air was to health, he went on to speak of the great necessity there was for improvement in this direction, in so far as schools are concerned. He referred with satisfaction to the position Aberdeen occupied in having, in proportion to population, introduced the mechanical system of ventilation in more schools than any other town in the country. Aberdeen had introduced the system in four schools; and in the whole of England and Scotland there were only seventeen schools so ventilated. In almost all schools the cubic space was far too little, and the ventilation was deficient. It was necessary that ample cubic space should be provided, because if the space were small the amount of ventilation that would be required would have the effect of creating draughts, which might be more injurious than impure air. The older a school was the more micro-organisms there were; and the younger the children, the less carbonic acid and the more germs; boys made the air of a school much more impure than girls. As to what to do to render the air better, he said he had visited, eighteen months ago, 150 schools with 110,000 scholars, and had received details regarding 173 other schools with 165,000 scholars, and he had come to the conclusion that mechanical ventilation should be adopted in all new schools. It gave much greater purity to the air, and it was much more independent of the weather than any other means of ventilation. There was a more equal distribution of the hot and the fresh air; mechanical ventilation was very effective in diminishing the micro-organisms, and it reduced the draughts to a minimum. It was far more conducive to health and comfort, and it was a factor in increasing the power of teaching and learning. The cost of such a system in a school for 1,000 scholars was £40 per annum. At the close Professor Carnelley was cordially thanked for his address.

Miscellanea.

Association of Manchester Students of the Institution of Civil Engineers.—At a meeting of the Association of Manchester Students of the Institution of Civil Engineers, held on Wednesday, the 20th inst., Mr. J. Proctor, M.Inst.C.E., in the chair, a paper was read by Mr. Thos. Ashbury, Assoc.M.Inst.C.E., giving a description of the proposed "Channel Bridge," designed by Messrs. Schneider & Hersent, to connect England and the Continent, a subject which has from the beginning of this century occupied the minds of a great number of eminent engineers. The author gave a general description of the proposed bridge, situation, foundation works, the caissons, the situation and dimensions of the brickwork supporting the columns, the masonry, the construction, conveyance, and fitting into position of the supporting columns, levelling the ground and filling in the concrete base, materials and machinery required for the completion of the works, selection of systems of girders, and arrangement of metallic superstructure, construction, transport, and putting into position of the metal spans and cantilever arms, and machinery necessary for the same, estimates of weight, time required for the work and cost, the length of the bridge being twenty-four miles, estimate of cost 34,400,000*l.*, and time required ten years. After discussion, on the motion of Mr. E. T. Ward, A.M.I.C.E., seconded by Mr. A. W. Lawson, Stud.I.C.E., and supported by the Chairman, a hearty vote of thanks was unanimously passed to the author for his paper. We gave a view of the proposed bridge in the *Builder* for Oct. 19.

Narrow Escape of Beverley Minster from Fire.—The Rev. Precentor Venables, in a letter to the *Times*, narrates the narrow escape of Beverley Minster. He writes:—"A few days ago sparks were seen to issue from the roof of the choir. Help, happily, was at hand, and the fire was speedily got under, but not till two or three of the main beams had been burnt through. The cause of the fire was the usual one—plumbers working on the roof, and carrying their fire-pans up with them to that windy height. Such work must ever continue necessary, for leaden roofs will ever need repair. But it need never be dangerous. No fire need ever be taken to the roof. I speak from experience. For the last twenty years the roofs of Lincoln Cathedral, which are of vast area, have been continually under repair; but our rule has been, whenever a defect has appeared, to strip off the whole faulty sheet, re-cast it, and replace it. No fire is on any pretence allowed to be taken to the roof, nor—and this is most important—is any soldering allowed to patch-up holes. This is the chief cause of danger. Soldering is profitable to plumbers, and, therefore, popular to them; but it must be sternly prohibited as fraught with peril to the building. The Lincoln plan is perhaps a costly one, but it is the only safe one, and it may turn out to be the cheapest in the end, when one realises the cost incurred, to say nothing of other more serious losses, by the conflagration of a great church or cathedral. Is it too much to hope that this plan may become the rule instead of, as I fear it, the exception?"

The English Iron Trade.—Although the English iron market has been lately somewhat unsettled by the action of speculative investors, a more confident feeling has now been established in the trade. It is now certain that the recent advances were the natural result of a large and growing demand, and that we may look forward to a steady market and continued activity. There is a quieter tone in pig-iron, but it is combined with strength and firmness. The Glasgow and Cleveland warrant markets have been less excited; prices are lower for the former, and about the same as last week for the latter. Scotch makers' iron, although still in good demand, shows some up-and-down fluctuations. Bessemer pig in the north-west has receded 3s. per ton, and east coast brands are a shade lower, notwithstanding that it is scarce. The inquiry for manufactured iron has somewhat revived, although rates are almost prohibitive. The demand for steel continues very active, but slight reductions in prices are reported; steel material in the north-west being about 2s. 6d. a ton lower. Ship-building has again been stimulated by fresh orders placed this week. Engineers continue actively employed.—*Iron*.

The Proposed Edinburgh Exhibition.—On Monday a meeting of the London committee recently formed in connexion with the forthcoming International Exhibition of Electrical Engineering, General Inventions, and Industries, at Edinburgh, was held at the Mansion House. The Lord Mayor (Sir H. A. Isaacs) presided, and there were present Sir Lyon Playfair, Captain Shaw, C.B., Mr. G. N. Hooper, Mr. James Paxman, Major Flood-Page, Mr. W. Oldham Chambers, Mr. J. C. Chubb, and a deputation from Edinburgh, consisting of Mr. R. Cranston, jun., Councillor Kinloch Anderson, Mr. A. R. Bennett, Mr. G. E. Watson, and Mr. Mitchell Thomson. The Lord Mayor having opened the proceedings, Sir George H. Chubb, chairman of the London committee, said it had been thought desirable to form that committee in connexion with the exhibition to give to those undertaking the arrangements the benefit of their advice and experience; and from the number of persons of eminence and distinction who had consented to join the committee there could be no doubt that the metropolis and the south of England generally would be well represented. They were especially glad to have the countenance and support of the Lord Mayor. The duties of the committee would be light, and the members would have no responsibility, monetary or otherwise, but it would be, perhaps, well to appoint a small sub-committee to further the interests of the exhibition. Mr. S. Lee Bapty, the general manager of the exhibition, said, speaking from experience of other similar undertakings, the prospects of the exhibition were extremely favourable. It had an exceptionally fine site of 90 acres, and there would be two railways within the grounds. The buildings were well under way, and the applications for space were very satisfactory. Foreign nations would be remarkably well represented. Councillor Anderson, of Edinburgh, said the idea of holding an electrical exhibition was due to the fact that electricity was a subject more before the public at present than perhaps any other. Large communities and companies were considering the matter of electric lighting and the uses of electricity for general purposes, and it was thought that to have a demonstration of electrical engineering and inventions on a scale never before attempted would be to the general benefit of the country at large. There would be, besides the electrical exhibits, classes for general inventions and industries and the fine arts. Mr. G. E. Watson, the Secretary of the exhibition, said the guarantee fund amounted already to 23,000*l.*, and the buildings would cost 35,000*l.*, or more. The exhibition would be open from May 1 to Nov. 1, and applications for space would be received until Jan. 1 next.

Civil and Mechanical Engineers' Society.—On the 13th inst. Messrs. David Kirkaldy & Sons received the members of this Society at their testing and experimental works, 99, Southwark-street. Mr. Kirkaldy, sen., showed his drawings of the historical steamship *Persia*. This is a most excellent piece of artistic draughtsmanship, and is stated to be the only mechanical drawing ever accepted and hung by the Royal Academy. In the presence of the visitors a tensile test was carried out on a piece of steel with 3 in. cross-sectional area in the million lbs. machine, which Mr. Kirkaldy built many years ago in such a way that it might equally well bring destruction on a girder 25 ft. long or a full-sized bridge strut, and also test exactly a small specimen of tinplate. The company were next shown the extensive and well-arranged museum, fitly described by a member as a "Temple of Destruction," where they saw specimens of every kind of material, which had been submitted to every kind of stress, and amongst them several evidences of rascality which the engineer who does not have a percentage of his material tested always exposes himself to.

Builders' Clerks' Benevolent Institution.—At a special general meeting of the donors and subscribers, convened by advertisement, and held at the offices, 21, New Bridge-street, E.C., on Tuesday, the 26th inst., Mrs. Fisher, the widow of a builder's clerk, was elected to the pension of 20*l.* per annum by show of hands, she being the only candidate. This makes a total of nineteen pensioners now on the books of the Institution. The proceedings were very brief, and at the close a vote of thanks was presented to Mr. E. Graystone (of the firm of Messrs. Hall, Beddall, & Co.), who kindly presided, in the unavoidable absence of Mr. John Aird, M.P., the President of the Institution.

British Archæological Association.—The new session of this Association was commenced by a meeting on Wednesday, November 20, the Rev. S. M. Mayhew being in the chair. It was reported that the proposed demolition of the ancient Butter-market, Dartmouth, had been reconsidered, and that the buildings were now safe. A certain portion of the domestic buildings of Eggeston Abbey have recently been demolished, and a remonstrance had been addressed by the Association to the owner in favour of preserving what still remains. Mr. J. T. Irvine exhibited sketches of some curious objects of antiquity recently found near Crowland. Mr. Earle Way described an ancient tumulus at Leafield, Oxon, and exhibited a stone mortar which was found in searching for treasure in the tumulus about sixty years since. It was filled with Roman brass coins at the time of its discovery; specimens of the coins were exhibited. Mr. Oliver read a description of the fine brass of Flemish execution, in All Saints' Church, Newcastle, to the memory of Roger Thornton, 1429, and exhibited a rubbing. (We illustrated this brass on one of our double-page plates on November 16.) Mr. Lynam described a curious earthwork or fortified post, to which much local attention has recently been drawn, but which does not seem to have been previously examined with much attention. It is situated in the valley of the River Blythe, about four miles from Stoke-on-Trent. It consists of a rectangular space 155 ft. by 150 ft., surrounded by double ditches, while a third extends along a single side. These are sunk in the general level of the site, and there are no raised banks. The quadrangular form suggests a Roman origin, and a Roman road existed at no great distance from the site. Mr. Loftus Brock, F.S.A., exhibited various portions of fifteenth-century service-books, which had been used by foreign bookbinders for covering printed books of sixteenth-century date. One sheet of MS. still did duty as cover to an Italian book printed at Venice, 1553. The first paper, illustrated by some capital rubbings of brasses, was by Mr. C. H. Compton, on South Creake, Norfolk. The second paper was by Mr. Thos. Morgan, F.S.A., and had for its title, "The Rose of Provence and the Lilies of France."

PRICES CURRENT OF MATERIALS.

	£.	s.	d.	£.	s.	d.
TIMBER.						
Greenheart, B.G. ....ton	7	0	0	7	15	0
Teak, E.I.....load	12	0	0	14	0	0
Sequoia, U.S.....foot cube	0	2	3	0	3	0
Ash, Canada.....load	3	0	0	4	5	0
TIMBER (*continued*).						
Birch ,, ...	3	0	0	4	15	0
Elm ,, ...	3	10	0	4	15	0
Fir, Dantsic, &c.	2	0	0	3	10	0
Oak ,, ...	2	10	0	4	10	0
Canada	5	10	0	7	0	0
Pine, Canada red	2	10	0	3	10	0
,, yellow	3	0	0	5	5	0
Lath, Dantsic.....fathom	4	10	0	5	10	0
St. Petersburg.....	5	0	0	6	10	0
Wainscot, Riga, &c.....log	2	15	0	4	5	0
Deals, Finland, 2nd and 1st...std.100	8	10	0	11	0	0
,, ,, 4th and 3rd.....	7	0	0	8	15	0
Riga	7	0	0	9	0	0
St. Petersburg, 1st yellow	11	0	0	14	0	0
,, 2nd ,, ...	9	0	0	11	0	0
,, white	8	10	0	10	0	0
Swedish	8	0	0	16	0	0
White Sea	9	0	0	17	0	0
Canada, Pine, 1st	16	0	0	26	0	0
,, ,, 2nd	11	0	0	17	10	0
,, ,, 3rd, &c.	8	0	0	10	10	0
,, Spruce, 1st	9	0	0	11	0	0
,, ,, 3rd and 2nd	7	0	0	9	0	0
New Brunswick, &c.	6	0	0	8	10	0
Battens, all kinds	6	0	0	17	0	0
Flooring Boards, sq., 1 in., prepared, First	0	11	0	0	14	0
Second	0	8	0	0	10	6
Other qualities	0	6	0	0	7	9
Cedar, Cuba.....foot	0	0	4½	0	0	5
Honduras, &c.....	0	0	4½	0	0	4½
Mahogany, Cuba	0	0	5	0	0	6½
St. Domingo, cargo average	0	0	5	0	0	6½
Mexican, cargo average	0	0	4½	0	0	5½
Tobasco ,, ...	0	0	5½	0	0	6½
Honduras ,, ...	0	0	5½	0	0	6½
Box, Turkey .....ton	4	0	0	13	0	0
Rose, Rio.....	15	0	0	20	0	0
Bahia	14	0	0	18	0	0
Satin, St. Domingo .....foot	0	0	9	0	1	6
Porto Rico	0	0	9	0	1	3
Walnut, Italian	0	0	4½	0	0	6½
METALS.						
IRON—Bar, Welsh, in London	7	0	0	7	10	0
,, ,, at works in Wales ...	7	0	0	0	0	0
,, Staffordshire, in London ...	8	10	0	9	10	0
COPPER—						
British, cake and ingot..... ton	53	0	0	54	0	0
Best selected	54	0	0	55	0	0
Sheets, strong	64	0	0	65	0	0
Chili, bars	47	0	0	0	0	0
YELLOW METAL.....lb.	0	0	5½	0	0	5½
LEAD—Pig, Spanish .....ton	14	0	0	14	5	0
English, com. brands.....	14	0	0	14	7	6
Sheet, English.....	15	15	0	16	0	0
TIN—Straits	98	10	0	0	0	0
Australian	97	0	0	0	0	0
English Ingots.....	101	0	0	0	0	0
OILS.						
Linseed .....ton	21	2	6	21	7	6
Cocoanut, Cochin	26	0	0	26	10	0
Ceylon	23	0	0	23	5	0
Palm, Lagos ..... ton	26	0	0	0	0	0
Rapeseed, English pale	34	10	0	0	0	0
,, brown	33	0	0	0	0	0
Cottonseed, refined	23	10	0	0	0	0
Tallow and Oleine	21	0	0	40	0	0
Lubricating, U.S.	5	10	0	6	10	0
,, refined	7	0	0	12	0	0
TAR—Stockholm .....barrel	1	6	0	0	0	0
Archangel	0	15	6	0	15	9

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITION.

Nature of Work.	By whom Required.	Premium.	Designs to be delivered.	Page
New Police Buildings.....	South Shields Corp. ...	50*l.*, 30*l.*, and 20*l.* ...	Feb. 15th	ii.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Slop Vans	Paddington Vestry	*Official*	Dec. 2nd	xii.
Wrought-iron Fencing, Gates, Pillars, &c....	Hendon Local Board...	S. S. Grimley	do.	ii.
Cast-iron Pipes	Southend Local Board	P. Dodd	Dec. 3rd	ii.
New Well	East Grinstead Gas and Water Company	E. Easton & Co.	do.	ii.
Re-sewering and Paving Mews	Ealing Local Board.....	*Official*	Dec. 5th	xii.
Stores	G. N. R. Co.	do.	Dec. 7th	ii.
Roadmaking Works	Hendon Local Board ...	S. S. Grimley	Dec. 9th	xii.
Supply of Stores, &c.	St. Mary (Islington) Vestry	*Official*	do.	xii.
Kerbing, Tarpaving, Metalling, &c., Works	Lewisham Bd. of Wks.	do.	Dec. 10th	xii.
Sewering and Making-up Road	West Ham Council.....	Lewis Angell.....	do.	xii.
Roadmaking and Paving Works	Fulham Vestry.....	W. Sykes	Dec. 11th	xii.
Roadmaking Works	Wood Green Local Bd.	*Official*	Dec. 13th	ii.
Works and Materials.....	St. George (Hanover Square) Vestry	G. Livingstone.....	Dec. 14th	xii.
Broken Granite and Flints	Southend Local Board	P. Dodd	Dec. 17th	xii.
Sewer and other Works.....	Acton Local Board.....	D. J. Ebbetts	do.	xii.
Works at Outlet and Roads, Thirlmere Wwks	Manchester Corp.	G. H. Hill	Dec. 24th	xii.
Palm House, with Boiler, &c., Exeter.....	.....	E. H. Harbottle	Not stated.	ii.
New Church, Stoke-on-Trent	.....	C. Lynam	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Premium.	Applications to be in.	Page.
Drawing Clerk (Surveying Department).....	Hackney Bd. of Works	30s. weekly	Dec. 2nd	xvi.
Sanitary Inspector	Whitechapel Bd.of Wks.	125*l.*	Dec. 5th	xvi.
Assistant Sanitary Inspector	St. Mary (Newington) Vestry	125*l.*	Dec. 7th	xvi.
Junior Assistant in Surveyor's Office	Blackpool Corporation	60*l.*	Dec. 11th	xvi.
County Surveyor.....	Glamorgan C. C.....	750*l.*	Dec. 20th	xvi.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

FELIXSTOWE.—For pulling down the present women's wing at the Suffolk Convalescent Home, the erection of the new Cuthbert Quilter wing, and the execution of other works for the Committee of the Institution. Mr. E. F. Bisshopp, architect, Ipswich:—

A. Brown	£3,650	0	0
H. Everett & Son	3,599	0	0
Geo. Grimwood & Sons	3,498	0	0
H. Runnacles	3,494	0	0
J. Grimes	3,400	0	0
A. Coe	3,250	0	0
T. Ward, Felixstowe (accepted)	3,200	0	0

LONDON.—For building new offices, &c., Whitfield-street and Paradise-place, Finsbury, E.C., for Messrs. Blades, East, & Blades. Mr. C. R. Winter, architect, 119, Finsbury-pavement, E.C. Quantities by Mr. Mark W. King:—

E. Todd	£1,020	0	0
Jas. Greenwood & Son	994	0	0
Clark & Bracey	959	0	0
John Greenwood	955	0	0
Jas. Kent	947	0	0
W. Smith, Son, & Fletcher	936	0	0
Woodward	929	0	0

LONDON.—For pulling down and rebuilding 2, Great Titchfield-street, W. Mr. W. J. Miller, architect, 182, Oxford-street, W.:—

Titmas	£1,669	0	0
Bywater	1,639	0	0
Stevens	1,625	0	0
A. A. Webber, Mortimer-street*	1,616	0	0

*Accepted.

LONDON.—For rebuilding No. 8, Prince's-street, Wilson-street, Finsbury. Mr. Sidney G. Goss, A.R.I.B.A., architect, 48, Finsbury-circus, E.C.:—

J. Grover & Son	£1,700	0	0
J. Morter	1,697	0	0
J. T Chappell	1,688	0	0
J. W. Mollett	1,647	0	0
E. Toms	1,639	0	0
Neave & Neave (accepted)	1,519	0	0

LONDON.—For alterations, &c., at premises 11, Tokenhouse-yard, E.C. for Mr. J. Jones. Mr. W. Jacobs, surveyor, 1, Angel-court, E.C.:—

Frost	£573	0	0
Patrick & Son	547	0	0
Killby & Gayford	507	0	0
Richardson Bros.	483	0	0
Coldwells & Son (accepted)	378	0	0

LONDON.—For the erection of a pavilion in the garden enclosure of Finsbury-square. Messrs. William Reddall & Son, architects, 10, South-street, Finsbury, E.C.:—

Woodward & Co.	£553	0	0
Killby & Gayford	430	0	0
Heeps	423	0	0

LONDON.—For additional stabling at Castle-street, Finsbury, for Messrs. McNamara & Co. Mr. Lanham, surveyor:—

G. Parker (accepted)	£1,075	0	0

[No competition.]

STAINES.—For erecting four houses, Laleham-road. Mr. W. I. Chambers, architect:—

T. Trust, Ascot	£2,849	0	0
G. Reavell, Staines	2,500	0	0
Jas. Norris, Sunningdale	2,495	0	0
Oades Bros., Egham	2,400	0	0
J. A. Baker, Staines	2,400	0	0
Mathews & Mann,* Weybridge	2,257	0	0

* Accepted, subject to modifications.

SWANSEA.—For new stables and dwelling-house in Frog-street, Swansea. Mr. H. C. Portsmouth, architect, Swansea. Quantities by the architect:—

Jenkins Brothers, Swansea*	£2,375	0	0

*Accepted.

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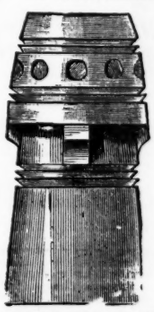

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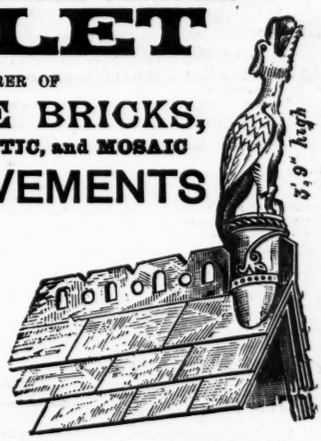

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OFFICES: 55, VICTORIA STREET, WESTMINSTER.
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TO MANUFACTURERS, INVENTORS, &c.—An Australian Builder and Contractor, doing a large business, would be glad to hear of any new materials or appliances for building and contracting work, with a view of their introduction in Australia.—Address, Box Z. care of Gordon & Gotch's Advertising Offices, St. Bride-street, London.

VENTILATION.—H. J. JOHNSON & CO. Albert-square, Manchester, require AGENTS in all towns as yet unrepresented for the sale of Ventilating Appliances. Terms, commission only.

VESTRY OF ST. MARY, NEWINGTON, SURREY.
ASSISTANT SANITARY INSPECTOR WANTED.
The Vestry of the above Parish having resolved to APPOINT an ASSISTANT SANITARY INSPECTOR at a salary of 125*l.* per annum, application, with copies of three testimonials of recent date, will be received by the undersigned at the Vestry Hall, Walworth-road, S.E. not later than SATURDAY, the 7th DECEMBER, 1889.
Age of Candidate to be not less than 30, nor exceed 45.
The person elected will be required to devote the whole of his time to the duties of his office, and not engage or be concerned in any other office, appointment, or occupation. Preference will be given to candidates possessing a practical knowledge of the work, and holding a certificate from a sanitary examining body.
Candidates are not to attend unless requested.
Further information may be obtained on application at the Vestry Hall.
By order, L. J. DUNHAM, Vestry Clerk.
Vestry Hall, Walworth-road, S.E.
November 27th, 1889.

GLAMORGANSHIRE.—Notice is hereby given that a COUNTY SURVEYOR is REQUIRED by the County Council of Glamorgan.
The Duties of the Surveyor will be to Superintend the Main Roads, Bridges, and County Buildings of the said County.
Salary Seven Hundred and Fifty Pounds per annum, which includes an allowance of One Hundred and Fifty Pounds per annum for clerks, offices, travelling, and all other incidental expenses.
The Surveyor must be an experienced Civil Engineer, capable of surveying and making roads, and reporting thereon, of planning and erecting bridges, and reporting thereon, and of generally superintending the County buildings. He must devote his whole time to the service of the County, and must reside at Neath, Pontypridd, or Bridgend. The appointment to be determinable by three months' notice in writing, by either side.
All further information may be obtained of the undersigned, to whom all applications, accompanied by original testimonials and a statement of the age of the applicant must be made by letter only, so as to reach him not later than the TWENTIETH day of DECEMBER, One thousand eight hundred and eighty-nine.
Any applicant whose personal attendance before the County Council is at any time required will be duly notified of the fact.
RICHD. E. SPENCER,
Clerk to the Roads and Bridges Committee of the said Council.
No. 6, Working-street, Cardiff.

SANITARY INSPECTOR required by the Whitechapel District Board of Works.
Preference will be given to an efficiently qualified man, who must not be less than 25, nor more than 45 years of age, and must reside in the district.
Salary 125*l.* per annum.
Applications, with copies of testimonials, to be sent to the undersigned before the 5th of December, 1889.
ALFRED TURNER,
Clerk.
No. 15, Great Alie-street, E.
November 27th, 1889.

BOARD of WORKS for the HACKNEY DISTRICT.
SURVEYOR'S DEPARTMENT.
REQUIRED, the Services of a DRAWING CLERK.
Candidates must be competent to make surveys, take levels, and prepare accurate plans and sections, and should also be quick at figures. Salary, 1*l.* 10s. per week.
Applications, stating age and present occupation, and accompanied by copies of not more than three recent testimonials, to be delivered at the Town Hall, Hackney, not later than FOUR o'clock on MONDAY afternoon, 2nd DECEMBER, 1889.
RICHARD ELLIS,
Clerk to the Board.
Town Hall, Hackney, N.E.
November 20th, 1889.

BLACKPOOL CORPORATION.
The Corporation of Blackpool require a JUNIOR ASSISTANT in their Surveyor's Office. Salary 80*l.* a year.
Applicants to state age, and where employed, and applications together with three original testimonials to be sent to the Town Clerk, endorsed "Junior Assistant," not later than the 11th DECEMBER, 1889.
Particulars of duties can be had upon application to the Borough Surveyor.
T. LOFTOS,
Town Clerk.

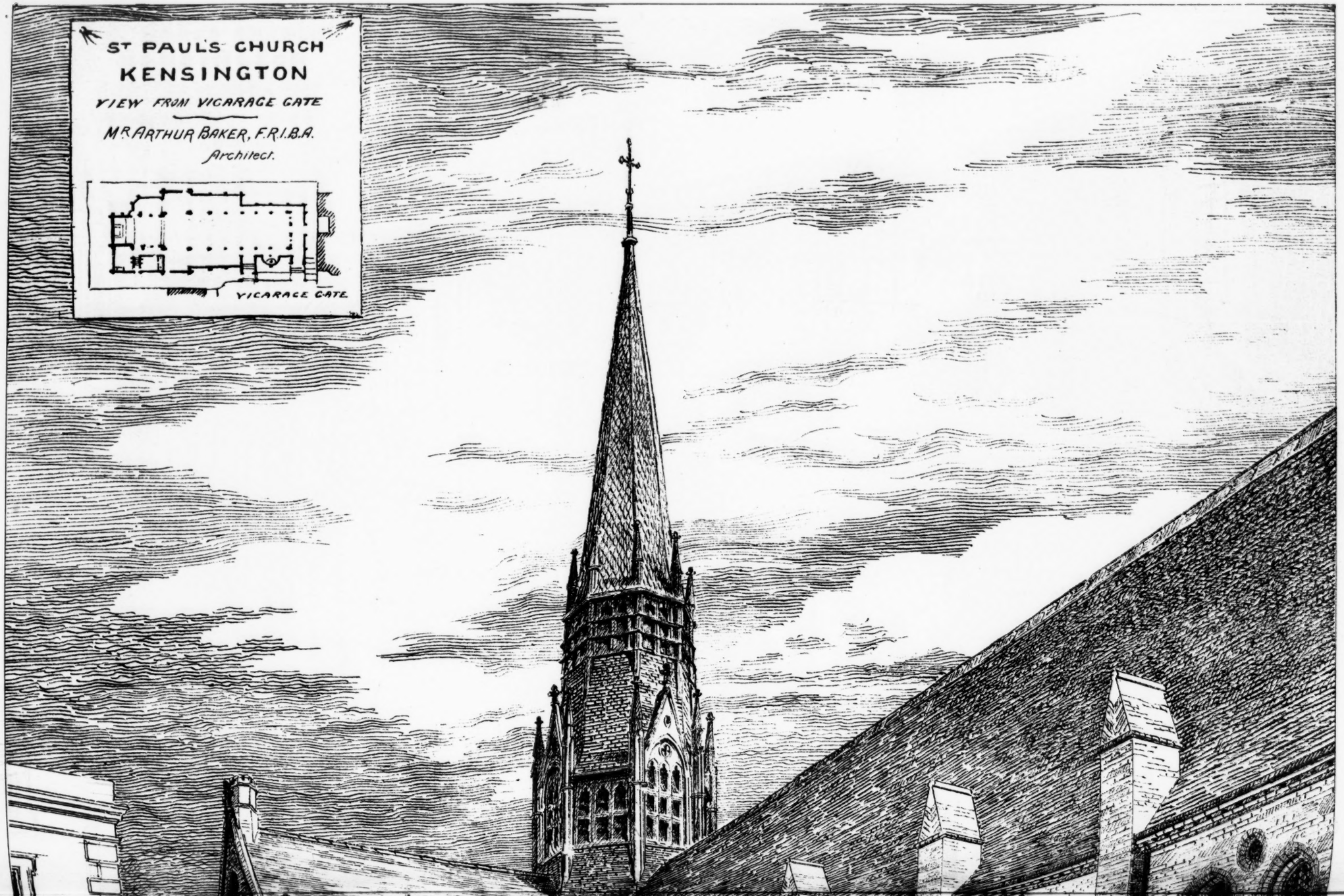
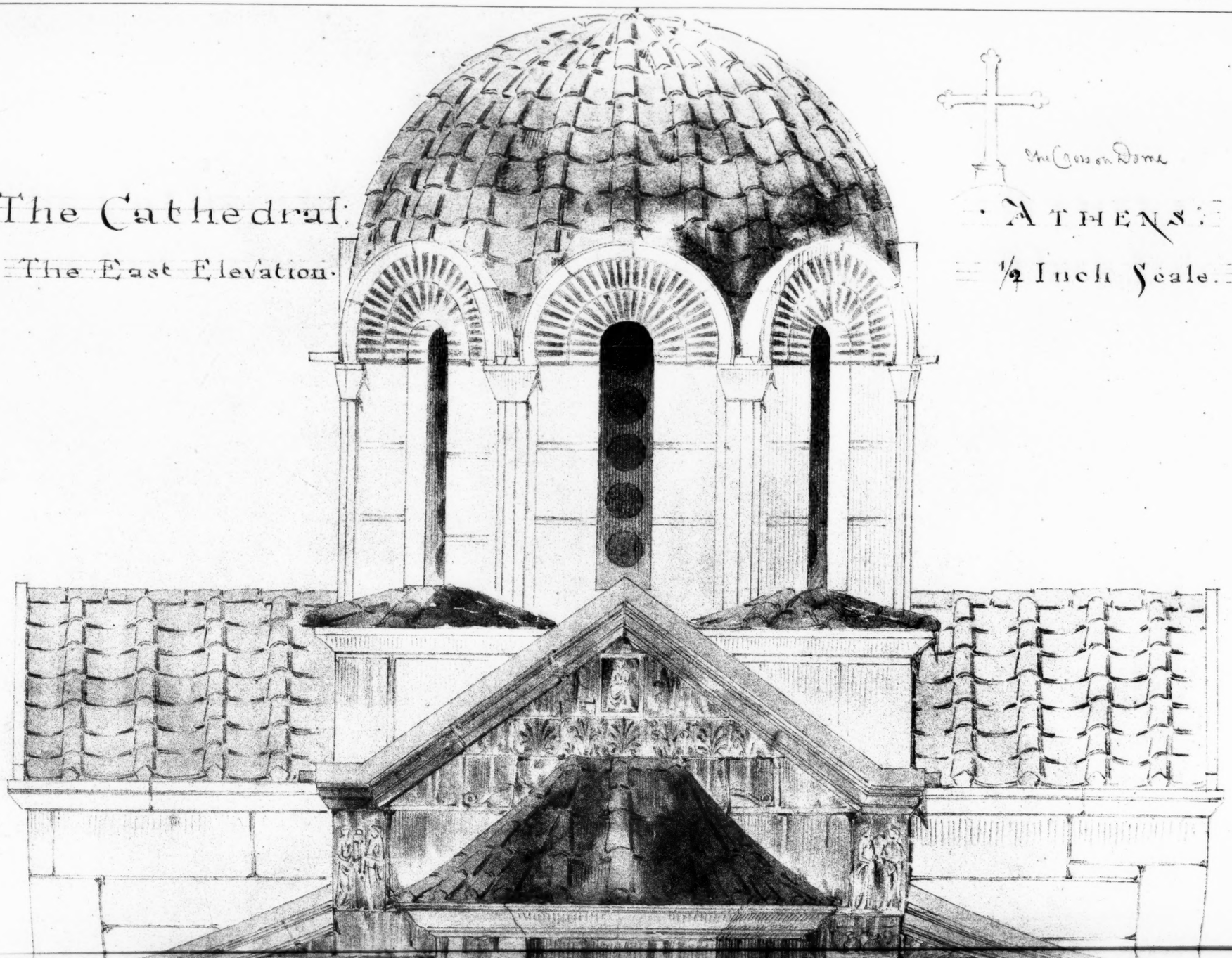

ST PAUL'S CHURCH
KENSINGTON
VIEW FROM VICARAGE GATE
MR ARTHUR BAKER, F.R.I.B.A.
Architect.
VICARAGE GATE

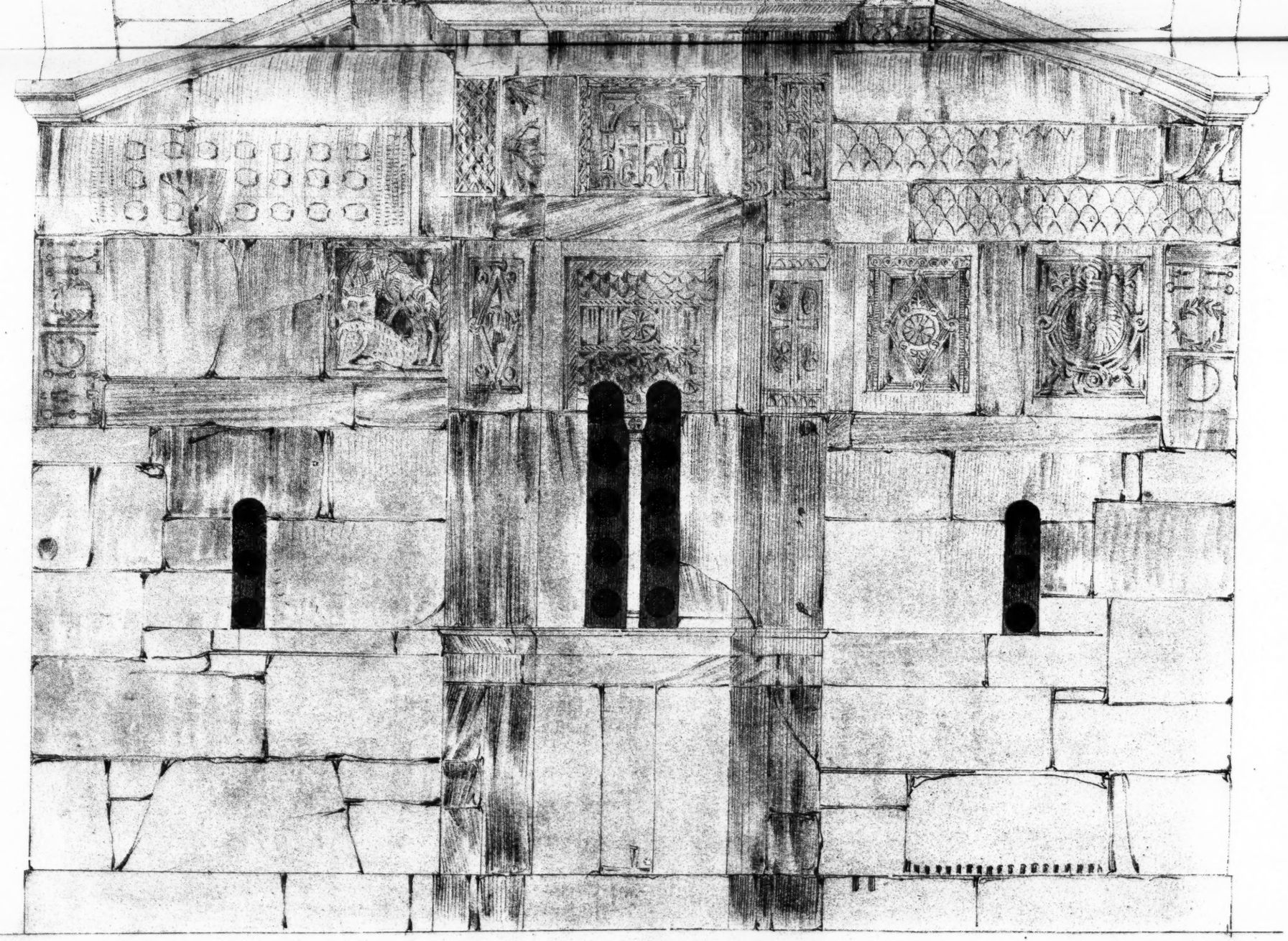
PHOTO-LITHO. SPRAGUE & Cº. 22, MARTINS LANE, CANNON ST. LONDON, E.C.

The Cathedral: ATHENS.

The East Elevation.

½ Inch Scale.



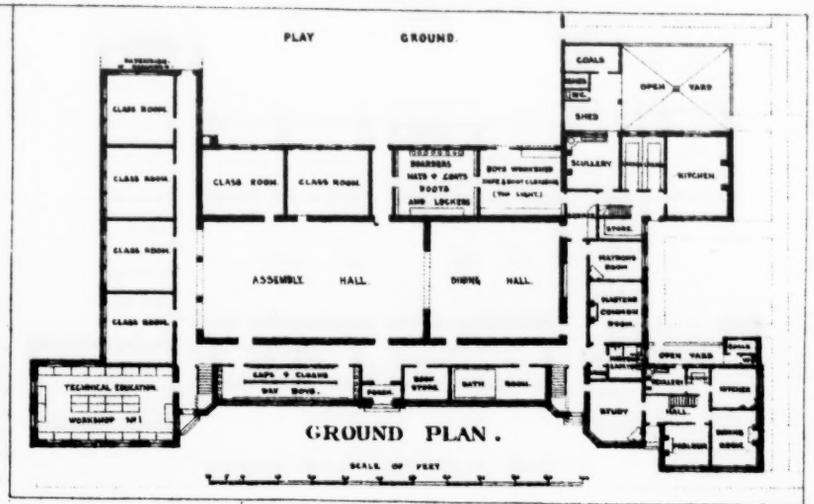


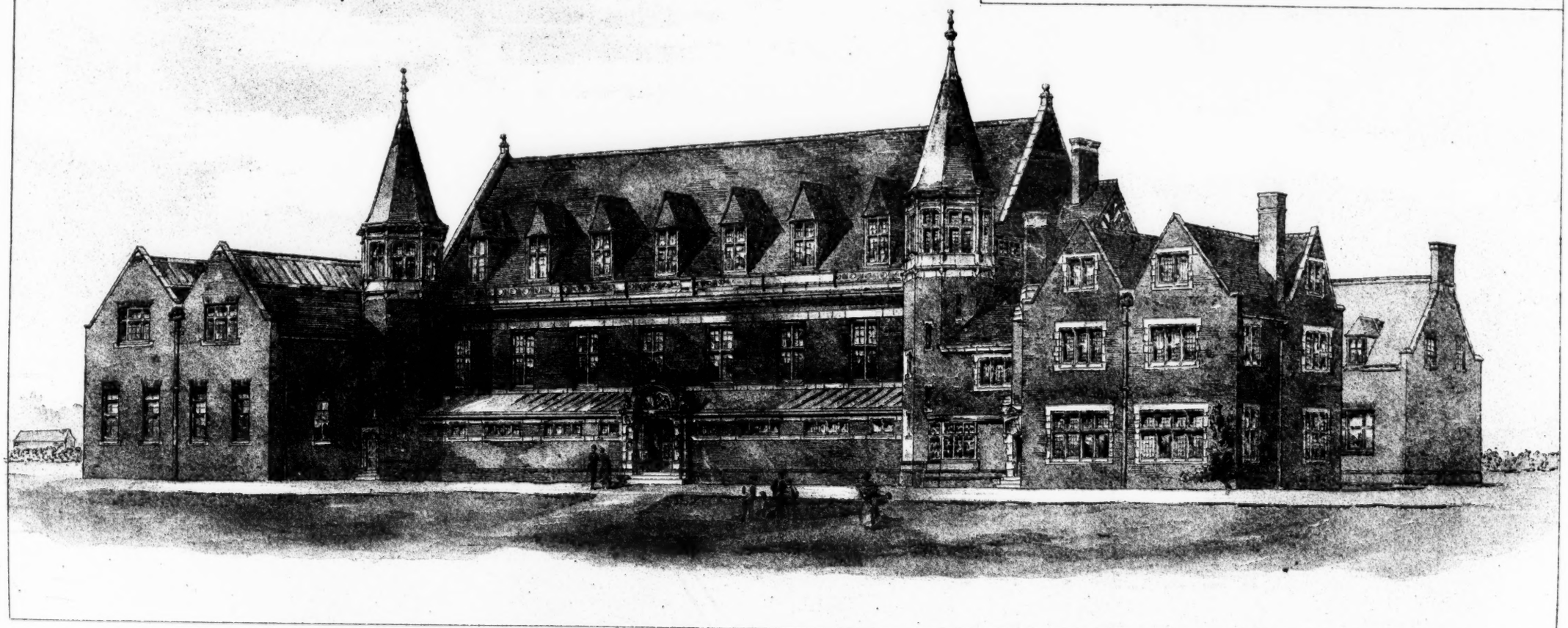
drawn by Sidney H. Barnsley.

"INK PHOTO." SPRAGUE & Co. 22, MARTINS LANE, CANNON ST. LONDON, E.C.

NEW BABLAKE SCHOOL COVENTRY.

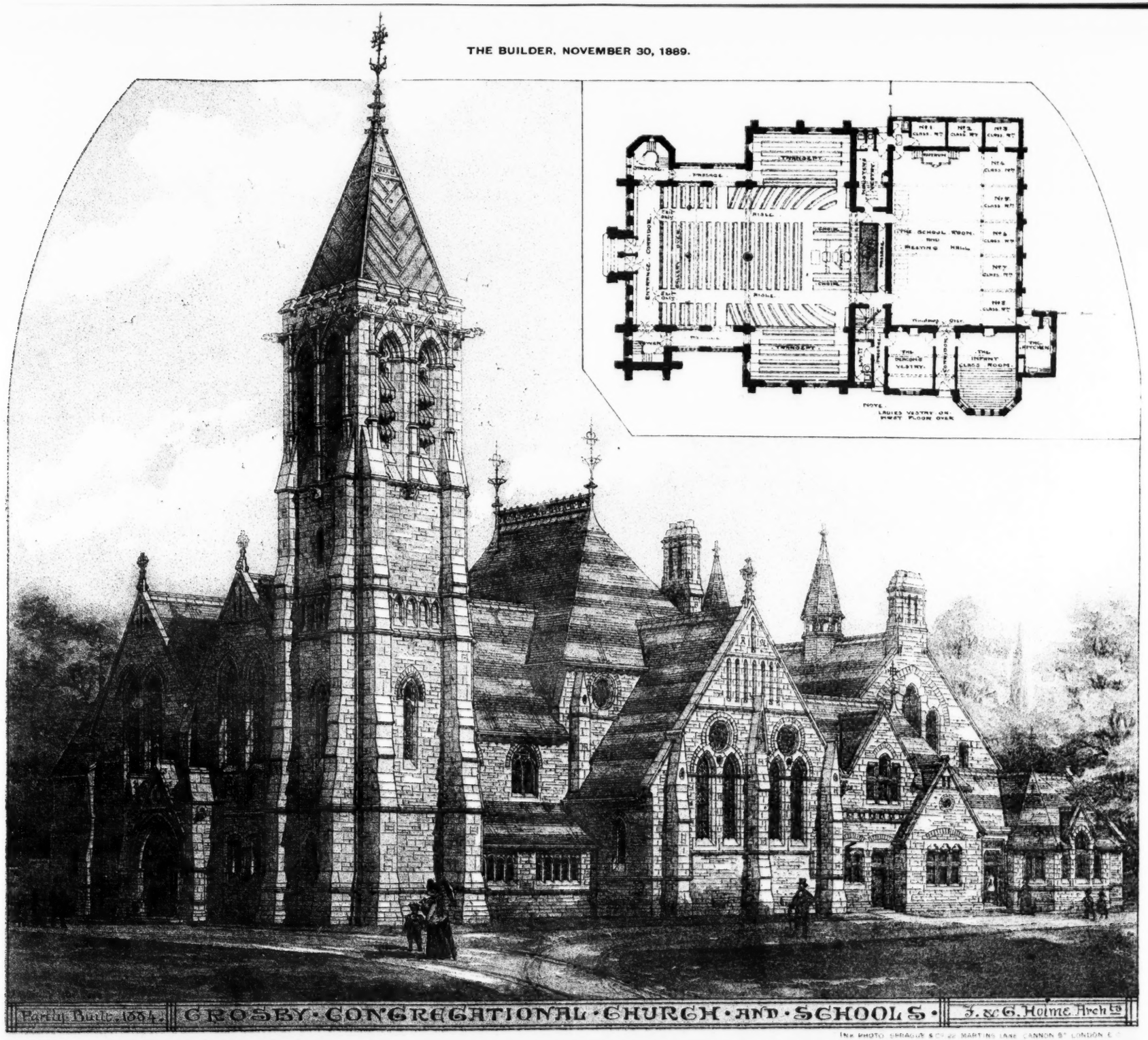
MULTUM IN PARVO.



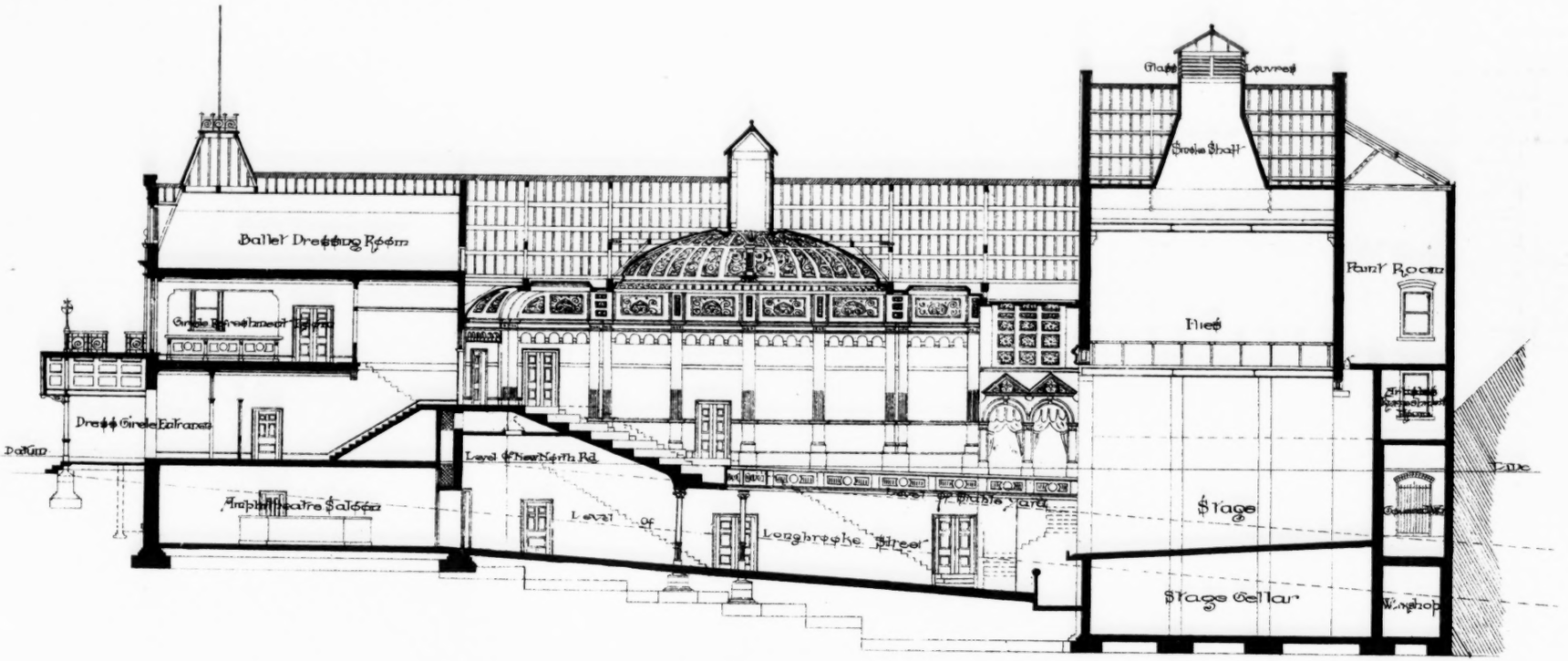


THE PHOTO. GRAPHIC & FINE ART CO., 66 & 67, MARTINS LANE, CANNON ST., LONDON, E.C.

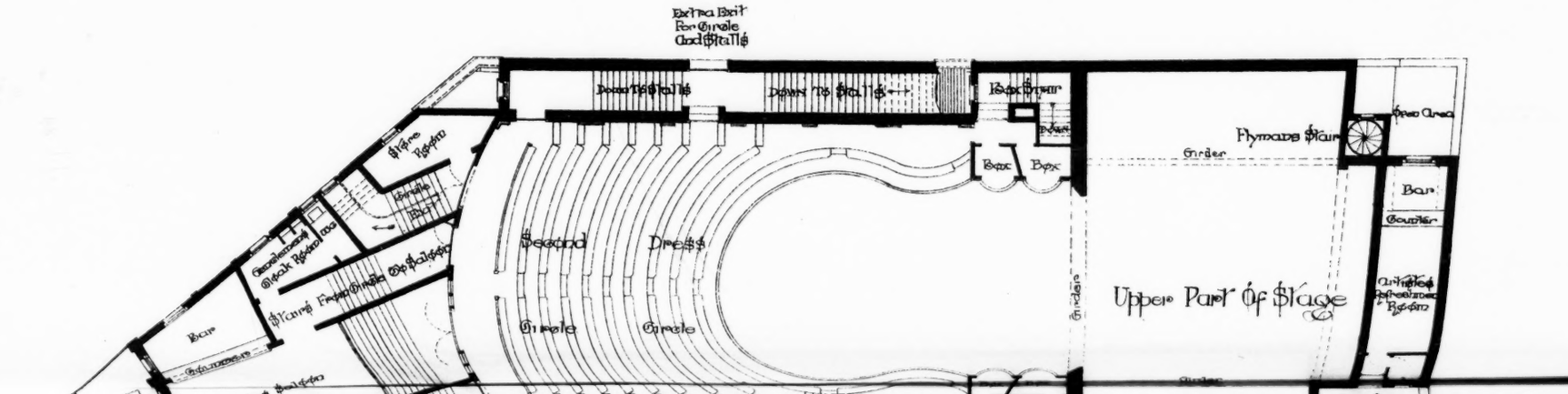
COMPETITION DESIGN FOR BABLAKE SCHOOLS, COVENTRY.—Mr. C. E. Bateman and Mr. H. R. Appelbee, Architects.



INK PHOTO. SPRAGUE & Co 22 MARTINS LANE CANNON ST LONDON E.C.



LONGITUDINAL SECTION ON LINE DD



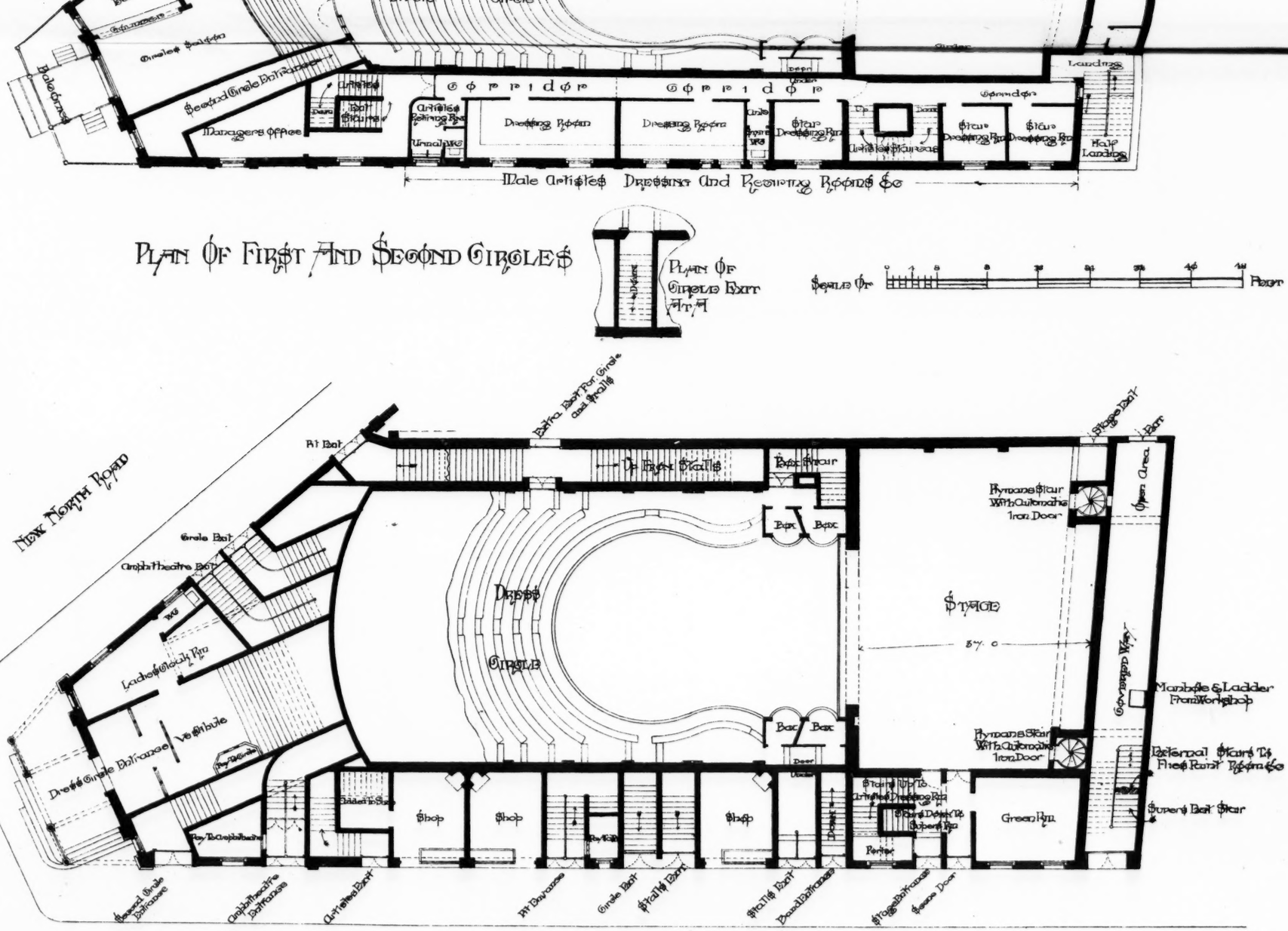


PHOTO-LITHO. SPRAGUE & Co., 22, MARTINS LANE CANNON ST. LONDON, E.C.

THE THEATRE ROYAL, EXETER, PLANS AND SECTION, AS REBUILT.—Messrs. Darbyshire & Smith, Architects.